Registered at the G.P.O., Sydney, for Transmission by Post as a Newspaper. Published Weekly.

THE

MEDICAL JOURNAL OF AUSTRALIA

(With which "The Australasian Medical Gazette," and "The Australian Medical Journal" are incorporated.)

The Journal of the Australian Branches of the British Medical Association.

VOL. II.—3RD YEAR—No. 23. SYDNEY: SATURDAY, DECEMBER 2, 1916. PRICE 6D.

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ROMANCE IN MEDICINE.

I.
THE THYROID AND INTERNAL SECRETION.[1]

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Once upon a time there was a lovely lady, lithe as Diana, beautiful as Venus, ready of wit and word as Scheherazade, the versatile and voluble story-teller of the Arabian Nights, the pride of her family and the life of her friends. But a strange sickness crept upon her. Her long, lustrous locks became scant and dry, as those on the pate of old Father Time. She grew bulky as Bacchus, listless, languid and laboured in thought and speech, as though enchanted by some evil genius.

Medicine and magic alike failed.

But a vision was vouchsafed to the priests in the temple of Æsculapius. So they sacrificed a lamb at the new moon and the full, and at each waxing and waning quarter, and of every lamb the lady ate her portion. Before one half-year had rolled around she was restored, transformed again to the veri-similitude of a goddess, her abundant tresses black and glossy as the raven's wing, her face smooth as the damask rose, her foot fleet as Atalanta's, her lips like Cupid's bow, while mirth flowed rippling from her silver tongue. But there was one essential condition of enduring well-being, she must eat weekly of the votive lamb. Morbid relapse was the certain penalty of forgetfulness or neglect.

I hope the title of my lectures has not misled you to expect only fairy tales. Truth is stranger than fiction, even in medicine. We find in its history much that is passing strange; so surprising as to be really romantic—as improbable as anything in the Arabian Nights Entertainment. It is from this point of view I propose to treat three medical subjects in my course of University lectures.

Perhaps the romance impresses me the more because so many "hidden mysteries" of my student days are now an "open book." I have watched the wonderful transformation. Most of the facts to be presented have been discovered and recorded during my own medical career. The inexplicable has been explained. Most intimate and even causal relations have been established between organs, processes, and complaints apparently unrelated. The whole complexion of medicine has changed.

The sweet lady (Miss Res Medica) who fascinated us forty years ago has much improved with age. She is wiser and better informed. When asked the reason why, she answers far less often "Why? Because." She is more capable, her arms are stronger, her fingers defter; more energetic, more prompt and sure in action; and is altogether a more interesting and helpful companion. And with the passing years we know she will still grow in stature and in knowledge, and in favour with men.

The subject of my lecture to-night is "The Thyroid Body, or the Story of Internal Secretions."

Here is the thyroid body. It lies in the neck, one lobe on each side united by what is called the isthmus of the thyroid, which crosses the windpipe just above the notch in the breast bone, where you can feel it when you swallow. Other animals have thyroids like our own, in the same place.

Long ago medical men were acquainted with cretins, human beings of stunted growth, clumsy shape, repulsive features, coarse skins, low mental development, dwarfs in body and in mind, who so remained to the end of life. For their cure nothing could be done. Care and kindness exhausted the possibilities of treatment.

In certain districts they were common; in Derbyshire and some Swiss valleys. There the disease was always present, and so was called "Endemic Cretinism."

Its cause was unknown. One strange circumstance was noted. In the same localities occurred an enlargement called "goître," or "Derbyshire neck." This was due to increased size of the thyroid. Most cretins had goîtres, and some adults who were not cretins. Women with goîtres might have children who were cretins. People coming newly to the district might acquire goîtres and their children be cretins. Some relation seemed to exist between the two. In fact, goître was suggested as a possible cause of cretinism. But about 40% of cretins had not goîtres, while adult men and women with large goîtres were not cretins, so this suggestion was dropped as untenable, and the relation remained quite obscure.

In 1850 Curling, an eminent surgeon, published an account of "Two Cases of Absence of the Thyroid Body and Symmetrical Swellings of Fat Tissue at the Sides of the Neck, Connected with Defective Cerebral Development."

These were two children, just like cretins in mind and body, with lumps of fat in the neck above the collar-bones. Both were found to be destitute of thyroid bodies. This was the first time their absence had been recorded. Curling was acute enough to see in this absence a possible cause of the condition of these children, and he discussed the question in reference to the lumps of fat in their necks, which, as a surgeon, he had been called in consultation to see. However, he could conceive of no explanation, if there were any causal relation. But in order to contribute towards a discovery of the function of the thyroid (which was quite unknown), he put the cases on record. He alluded also to the mental condition and the thyroid. As we said before, cretinism and enlarged thyroid are frequently

[1] Being a Lecture delivered in the University Extension Course on June 20, 1915.

found in the same patient, and enlarged thyroid had been suggested as a cause of the mental defect.

But in these two cases the mental defect was associated with an exactly opposite condition, the thyroid was absent instead of enlarged. Here it certainly could not be due to enlargement (which did not exist), and therefore he argued in cretins it was probably not due to the enlargement of the thyroid, when this did exist. Such is logic.

This is an instance of how near people may be to the truth and yet read their facts upside down, and so wander further away from the truth instead of finding it.

Here matters rested for 21 years. Then Dr. Hilton Fagge wrote a paper on what he called "Sporadic Cretinism," in England; he cited cases like Curling's of mental and physical dwarfs with absence of their thyroid. He thought cretinism was due to some poison; to this the thyroid body was antagonistic. He propounded a very ingenious theory. If the thyroid body is of normal size it can neutralize this poison, and there will be no cretinism, so we are not cretins. Should the thyroid be below normal size or absent, this poison will not be neutralized and cretinism will result. Should the poison be more intense it will produce cretinism even with a normal thyroid, because this is not now large enough to cope with the intenser poison. Should there be a very large thyroid (that is, a goître), it will be large enough to deal with this intenser poison, and there will not be cretinism. But should the poison be very intense, even a goître will not be sufficient to neutralize it, and cretinism will follow. The nature of his poison was unknown. The theory was really too ingenious to be true. The cause of Fagge's sporadic cretinism was unknown.

Two years later, in 1873, Dr. Gull wrote a paper entitled "A Cretinoid State Supervening in Adult Life in Women." In this complaint a patient of mature years gradually gets bulky in body, the features alter almost beyond recognition, the skin becomes coarse, the hair falls out, expression dies away, speech gets slow and thick, mental perception is dulled, energy is lost, and the patient gradually lapses into a state of corpulent and indolent apathy. Dr. Gull perceived an analogy between this affliction and the infantile cretinism of Fagge, and called it cretinoid; it looked like "sporadic cretinism" in adults instead of in children. Its course was similar. It was progressive and intractable. Whatever medicines were administered and however its apparent indications were met, all were of no avail, death inevitably ensued. The state of the thyroid body was not mentioned.

Four years afterwards, in 1877, Dr. Ord carried our knowledge a step or two farther. Chemical examination of the skin by C. Charles showed a great excess of mucin. The increased bulkiness of the body was not due to ordinary dropsy nor merely to fat, but to an infiltration of the tissues by this mucin, and he called the complaint myxœdema, which we might translate as mucoid dropsy.

Professor Greenfield, in a case which proved fatal, discovered the absence of the thyroid body. This observation seemed to clinch the suggested analogy between Gull's myxœdema in adults and Fagge's sporadic cretinism in infants, and to make more probable the causal relation between these conditions, and the lack of the thyroid body.

As time passed records accumulated of sporadic cretinism and of myxœdema, and almost invariably the thyroid was wanting.

Just here came an illuminating ray from the surgical side of the profession; numerous operations had been performed for the removal of goîtres, or enlarged thyroids. Some adults, whose thyroids had been removed, were found subsequently to fall into a state of ill-health, and J. L. Reverdin described in 1882 the peculiar train of symptoms observed, and called it *myxœdème operatoire*, or operative myxœdema. Another eminent surgeon with a large experience of this operation, Kocher, of Berne, in Switzerland (for we remember goître is endemic in some of the Swiss valleys), in 1883 described the same condition as cachexia strumipriva. He attributed it not to absence of the thyroid, which he had taken away, but to injuries of important nervous structures in the neck, unintentionally inflicted during the operation.

Fortunately, at this juncture, an astute practitioner in London, Felix Semon, remarked the close similarity between symptoms of myxœdema in Great Britain, and of cachexia strumipriva in Switzerland. The former was associated with absence of the thyroid, and the latter followed its removal. He concluded, therefore, very reasonably that, in both cases the symptoms were due to loss of the thyroid, and as sporadic cretinism, a very similar condition occurring in children, was associated with the absence of the thyroid, this was due to loss of the gland; and as for endemic cretinism, in which the thyroid was diseased, this was due to loss of the proper tissue of the thyroid; in fact, they were all really identical states, and were all due to loss of the normal tissue, and therefore of the function of the thyroid, whatever that function might be.

This was a splendid generalization. The thyroid had some special function to perform in the human economy. If the thyroid from any cause wasted away, this function would cease. If the gland were taken away by operation, it would cease. If the gland should become diseased, and its proper tissue were destroyed, as by a growth, though it might be very much larger than normal, its function would cease. Should the wasting or destruction, or removal of the thyroid occur in adult life, myxœdema would arise; should it, on the other hand, occur in infancy or childhood, the ordinary symptoms of myxœdema, as seen in adults, would be associated with want of growth and development, with dwarfing of the body and dwarfing of the mind, *i.e.*, with cretinism.

Still, though a splendid generalization, this was no more than a deduction. It was only an opinion; what Felix Semon thought. Jenner, the discoverer of vaccination, once wrote to the famous John Hunter and said he thought so and so about a certain problem. Hunter wrote back, "Don't think; but try," and suggested certain experimental tests.

This deduction of Semon's had to be tested, and so confirmed or refuted. The Clinical Society of London appointed a committee to investigate the whole matter thoroughly. Every possible source of information was put under contribution. Victor Horsley undertook a series of experiments on monkeys and other animals, and by vivisection incontestably proved that Kocher's cachexia strumipriva was due, and solely due, to loss of the thyroid, and not to accidental injuries of other structures in the neck. The report of the committee established the propositions that cachexia strumipriva and myxœdema are one and the same condition, that cretinism is myxœdema occurring in early life, and that all these maladies are due to loss of function of the thyroid body.

By the way, let me give the subject a local interest. At the second session of the Intercolonial Medical Congress, held in Melbourne in January, 1889, Dr. Manning, of Sydney, and Dr. Stirling, of Adelaide, read papers on sporadic cretinism, the former discussing one case from New South Wales and the latter six cases which had come under his notice in South Australia, one of them being a little patient of my own. These gentlemen reviewed all facts and theories up to date, and pointed out its identity with Dr. Gull's myxœdema and Reverdin's operative myxœdema and the relation of all these complaints to the loss of function of the thyroid.

There they and all of us had to stop. And it was a most unhappy terminus; we knew not what to do. When a patient entered my consulting-rooms I could tell at a glance sometimes the nature of the disease, and from previous experience knew the doom of this unfortunate; I might try to improve the quality of the blood, and tone up the circulation, and stimulate the nervous system, but every patient hitherto had proved absolutely refractory, and steadily declined in physical and mental power; while the pleasant, little, weak-minded dwarfs excited our interest and compassion and a sad sense of our impotence.

But relief was nearer at hand than we dared to hope. The very next year Victor Horsley suggested a remedy.

An experimenter had removed the thyroid body from a dog, and so caused operative myxœdema. Again, he had opened the abdomen of a dog, and grafted into it the thyroid of another dog. Then, after a short interval he removed its own thyroid from its neck. It remained well, and did not get operative myxœdema, proving that a grafted thyroid can replace the natural thyroid, and perform its function.

But if a grafted thyroid can prevent myxœdema, might it not cure myxœdema? If a patient has myxœdema, because he has lost his thyroid, might we not give him one? But where is the thyroid to be obtained? What woman would sacrifice her thyroid and run the risk of myxœdema in order to cure a sister suffering from myxœdema? How would it do to try the thyroid of some lower animal?

This was Horsley's suggestion, and at once it was acted upon. Cretinous children, and myxœdematous adults were treated by grafting sheep's thyroids under their skin, and manifest improvement followed the operation.

But this expedient was not altogether successful. Most people shrink from anything in the nature of an operation. Besides, though a certain measure of improvement was wrought by grafting, this was not maintained, and the patient relapsed into a state as miserable as before.

Do you ask why? Because the surroundings of the graft were unnatural. It had not a proper and sufficient blood supply, and so it frequently wasted away, and the last state of the patient was worse than the first.

What then could be done? When a thyroid was grafted, how did it benefit? In health, is some substance formed by the thyroid necessary to well-being? When the thyroid is grafted into a patient is this substance gradually absorbed from the graft into the system, so as to effect improvement; and when the graft ceases to produce this substance, does improvement cease and the patient begin to retrogress?

Now, if this were the case, what would be the result if the substance formed in the thyroid could be obtained, say, in a fluid form, and this were injected under the skin, and were taken up by the absorbent vessels into the system? This possibly might prove just as effective as grafting.

Such was the line of reasoning of the next benefactor—Mr. G. R. Murray. He concluded that, in health, something is secreted by the thyroid, and is introduced into the blood, an internal secretion. If this secretion is contained in the tissue of the thyroid gland, and could be obtained from it in the form of a fluid extract, and this extract could be injected into a patient hypodermically, it ought to cure. This plan of treatment he suggested in 1891.

In order to test it, a glycerine extract of sheep's thyroid was prepared and injected at intervals beneath the skin of a patient, so as to ensure its absorption by the lymphatics, in the same manner as the normal secretion is conveyed into the circulation from the healthy gland. And he was able to write "The symptoms of myxœdema in the first case I treated in this manner rapidly disappeared at the end of three months, when the extracts of five lobes of sheep's thyroids had been injected, the patient was much improved in all the essential features of her malady."

By the end of 1892 the method had been tried in many other cases, and in almost all of them with complete success.

But even yet there was "a fly in the ointment." In spite of all precautions to secure perfect sterilization of the extract and the syringe and perfect asepsis of the skin, the site of hypodermic injection sometimes inflamed, and in not a few cases abscesses formed, and had to be opened and drained.

But to effect a permanent cure, the remedy had to be given regularly and without cessation; and occasional, or periodic, abscess as long as she lived, was not a happy prospect for a woman.

How could this be avoided?

Well, how else could the substance be introduced into the system? How do we introduce most things

into our bodies? Is it not by eating or drinking them? Suppose the thyroids were eaten, would they have the same potency? No one could tell. Snake venom, introduced into the circulation hypodermically, will speedily kill; but it may be swallowed in larger than lethal doses with impunity, showing that the digestive juices have the power to destroy its action, by changing its chemical composition. So the gastric or intestinal secretions might destroy the efficacy of thyroid extract, in which case the thyroids would do no good.

But why not try! This was done! Thyroid gland finely minced was made into a thin sandwich with bread, and administered to a lady. Within three weeks all symptoms of the disease had gone.

But even this method was not ideal. Raw thyroid is not the most inviting therapeutic preparation, and to most would be repugnant.

Besides, it must be taken fresh, and it is not always possible, and less frequently is it convenient, to obtain it, as I know from experience, for it was just as this time that I began to use the remedy, and well do I remember my visits to the butcher when he killed his sheep, so as to procure the thyroid glands and put them in my jar of boric acid solution, for use by one of my patients, who came at prescribed intervals to take a lobe or less, just as the epicure disposes of the succulent oyster.

The next advance was the preparation of an extract. Glands were ground up with cleaned, sterilized sand. A glycerine extract was made. To this, after being filtered under pressure, a little boric acid was added, to preserve it, next some chloroform water to give it a flavour, and then it could be administered in regulated doses. And the limit was reached when thyroid tissue was dried and ground to powder with certain indifferent substances and compressed into small tablets, in which form it retains all its curative properties in perpetuity.

Now cretinous infants, if treated early and adequately, grow in body and in mind with amazing rapidity, and are able to take their place in society, and do their proper work. Adults who are suffering from myxœdema can be freed from all their symptoms. Whereas in years gone by, the diagnosis of this condition was depressing, from the knowledge of its incurability and certain fatality, now, as soon as the complaint is recognized, the patient can be cheered up by a positive assurance of recovery. The medical man writes out his simple prescription with confidence, and has the pleasure of seeing his patient improve week by week, and within about three months completely restored to her former health and activity, to be regarded as "the miracle of the township," one raised up from what was worse than the grave. The woman who, thirty years ago, twenty years ago, was doomed to death, can now be made perfectly whole.

Men in South Australia, who would have been in their graves long years ago but for these little tabloids, have managed large businesses, been able politicians, and led in various spheres of life. And women wholly incapacitated by their bulk and their sloth have thrown off their burden at the rate of nearly a pound a day, have regained their bodily activity, mental quickness, recovered their beauty and vivacity, and have become their old loveable and capable selves, to the delight of husband and children and friends.

Does not the whole story sound like a romance? It is the romance of the lady and the lamb.

New diseases have been recognized, though, of course, existent before, and though quite dissimilar, and in some respects in antithesis to each other, yet, after a while, all are found to be intimately related, and, further, related to a mysterious body, whose use was formerly unknown, and the cure of this group of complaints has been rationally, gradually and completely evolved, till despair has given place to blessed assurance and the useless, mysterious thyroid is known as the source of a potent secretion essential to life and well-being.

But a wider view opens up to us, the abject state portrayed is that of one who has long lost the whole thyroid.

But we can easily imagine a thyroid whose function is but partially reduced; this might cause only one or two symptoms, or symptoms of a very mild degree. With the gland rather more wasted, these might be more marked. So why might there not be all grades of hypothyroidism, deficiency of thyroid substances, with all grades of symptoms? This imagination has proved to be a fact. There is larval or partial myxœdema, with moderate unwieldiness, dulness, baldness or coarseness of skin. Loss of hair may be due, not to senility, but to hypothyroidism. The pretty pink flush on the cheeks may have another origin than *le pot de rouge*, and so may a coarse skin, rotundity of form may not be the result of indolence or over indulgence, mental slowness may have a more curable cause than *Anno domini*. Many conditions are quite correctly attributed to hypothyroidism—a deficient functioning of the gland. The physician is alive to all such possibilities, and seeks to determine whether these solitary symptoms are not the minor manifestations of a deficient secretion of the thyroid. If they are, then they can be cured.

But our survey has been still more marvellously extended.

We used to call the structure in the neck the thyroid body, a curious lump of flesh with a peculiar structure, and of no known use. Sections of it showed tiny cavities lined with cells, containing a substance like thin glue, colloid material, as it is called. It had no duct like an ordinary gland. The breast is a gland, and secretes milk, which comes away through its ducts in the nipple. The lachrymal gland of the eye secretes tears, which come away through its ducts over the eye, and run down the cheek when too free. The parotid on each side of the face is a gland, and secretes saliva through a duct into the mouth. But the thyroid body has no duct, and pours nothing out on any surface, and yet evidently it manufactures something, and somehow that something enters the circulation, a something which is of vital importance to the economy, in childhood to growth and development, and in adults to the proper nutrition of skin and hair and teeth and brain.

The thyroid body therefore is a secretory organ, a gland, and though it does not excrete this sub-

stance externally by an excretory duct, it secretes it internally into the blood; it furnishes an "internal secretion," as it is called.

But if now there be one internal secretion by a ductless gland, why should there not be others from other ductless glands. A fresh field of investigation has thus been opened up, namely—internal secretions and ductless glands: of these we have the thymus, suprarenal, pituitary and the pineal.

Each doubtless has a special and important function in the economy. Just as from the thyroid we can extract a substance with very powerful and peculiar properties, so from these other ductless glands materials have been obtained, the most potent of our drugs, used in various complaints upon a rational plan. Thus have we secured such preparations as adrenalin and pituitrin, which are wonderful in their promptness and their power.

With each of these ductless glands, too, special diseases have been found to be associated.

Remarkable diseases they are, such as myasthenia gravis, acromegaly, and Addison's disease, about which we cannot now speak particularly.

Naturally, when these were recognized, we hoped that all we had to do was to administer extracts of their respective glands in their several complaints, and they would instantly respond to the treatment.

But they did not; they will not. Why? Because these diseases are not like myxœdema, due simply to lack of their secretion, to be cured by its supply; and the diseases associated with the thyroid stand first in time and almost alone in the completeness and certainty of their cure.

Man is exasperatingly intricate while we are seeking and amazingly simple when we find; but the maze will unfold itself to the tireless seeker yet.

Still another suggestion has originated, charged with most remarkable possibilities; may not the ordinary glandular organs, which discharge their well-known excretions through a duct, also have tissues in them forming internal secretions, passing imperceptibly into the blood?

The liver, it has long been known, not only excretes bile into the digestive tract, but secretes sugar into the blood, out of the glycogen which it first stores up within its cells.

So of late the pancreas has been proved not only to excrete the pancreatic fluid into the intestine, but to secrete some peculiar material into the blood from little areas called the islands of Langerhans, scattered through its substance. And this internal secretion of the pancreas appears to have some relation with the sugar formed by the liver.

Moreover, the thyroid secretion seems to influence this internal secretion of the pancreas. When the thyroid is diseased this stimulation is withdrawn, the internal secretion of the pancreas is withheld or altered, and so the sugar from the liver is not properly dealt with, and a form of diabetes may ensue.

An insight is thus obtained into the intricate interdependence of these different glands, and we come to understand how, when one member suffers, all the other members suffer with it, and how various may be the symptoms of disease of even one organ, and how careful and observant we must be if we wish to trace back the many and varied symptoms to the one primary disease which is the source of them all.

Medicine is thus shown to be no simple rule of thumb, but to present a whole series of problems, which, to be unravelled, demand an acute mind, and a patient, industrious and resolute investigation.

Patients who try to diagnose their own diseases and then to treat themselves are to be pitied. And one result of my lecture to-night, if my point has not been missed, will be to prevent them from trying this dangerous experiment, and seeking to accomplish in their ignorance what the best qualified medical men find a tax on their highest powers of observation, reasoning, and memory.

This discovery of myxœdema, due to deficient thyroid secretion in the most natural manner, led to another.

Suppose, now, in the treatment of myxœdema, the extract of the gland were given too freely, a train of symptoms the very reverse of those in this disease might be expected to arise.

The patient would get thin instead of fat, would feel too hot rather than too cold, would be restless instead of indolent, excited rather than dull, would talk too fast instead of too slow, would be sleepless instead of sleepy, with a pulse rapid and easily disturbed, instead of slow and insensitive. And if such a group of symptoms were found in a patient, what should we conclude? What, but that he was having too much thyroid, that his thyroid gland was over active, pouring too much of this material into his blood-stream. Such a complaint occurs, and is known as exophthalmic goître, with an enlarged thyroid, and the signs of mental and physical excitement. As a mother said of her daughter, so affected, "She thinks too fast, she talks too fast, she works too fast and does everything too fast." A few years ago the symptoms were quite inexplicable; now we understand them. The enlarged thyroid is working at too high pressure, producing too much of its peculiar internal secretion, and pouring it into the blood-stream.

What would the rational treatment be?

Reduce the amount of its secretion, then the symptoms should spontaneously disappear.

And how could this reduction be effected?

1. Remove a part of the gland, or lessen the amount of its blood supply, just as you would take some of the machinery out of a mill, or lower the pressure in its steam boilers. This has been done surgically by tying some of its feeding arteries, and so lessening its blood supplies, or by removing part of the gland itself. And these operations, especially the latter, have in many instances been brilliantly successful, and have relieved or cured the patient.

2. Give something which will antagonize the thyroid secretion, and give it in quantities just sufficient to neutralize as much of its secretion as is in excess. But that "something" is still to seek. We have drugs which will quiet some of the symptoms, but

nothing which will quiet them all. But we may find it.

3. Or give something which would act on the gland itself, and restrain its abnormal activity, inhibit it, as we say.

There probably is some substance in our system having such an action. Could we only discover it, we could with it quiet the excited and hyperfunctionating thyroid.

Did we but know what causes the thyroid gland to waste away, and produce cretinism and myxœdema, we might be able to prevent both these conditions from arising.

And we might be able to do more. If that cause were, as Fagge suggested, a poison, and we could discover its nature and isolate it, we might administer that substance to patients with exophthalmic goître, whose thyroids are too large and producing too much internal secretion, and, perhaps, we could thus make them waste away, until they were just of natural size and performing their function normally, and those patients would be practically cured. I wonder whether, if in such direction lies the road to success, it will be for the medical students of today to find out. The suggestion is thrown out gratuitously to any who will follow it up. Study every case of myxœdema and sporadic cretinism thoroughly, in its history as well as in all its manifestations, and to your peering eyes and seeking minds the goodly pearl may be revealed. I wonder whether the "something" in one of the wells in that Swiss Valley, which appeared to give goîtres and make cretins, 40% of them without goîtres, would if drunk by these exophthalmic patients make them better, and quiet down their excited and hyperfunctionating thyroids.

Can we but discover these substances, with their antidotal, inhibitory or atrophying power, they will replace the surgical operation of removing part of the thyroid, which will then have held the same transient and initial relation to exophthalmic goître as the operation for thyroid grafting did to myxœdema, which relation in time to come I prophesy it will hold.

Of course, directly cretinism and myxœdema were proved to be due to thyroid disease and to be cured by thyroid secretion, some sanguine optimists had visions of curing disease of an organ by the administration of an extract of the same organ from healthy lower animals, visions of marvellous results from a system of treatment which was christened organotherapy.

Diseases of the brain should respond to extract of brain substance. Diseases of the liver to extract of liver substance. Diseases of the kidneys to extract of kidney substance. Diseases of muscles to extract of red meat. Diseases of bone marrow to extract of bone marrow, and so on.

But the visions were mostly castles in the air, baseless fabrics, the cases were not analogous; there was no evidence that such diseases were due to want of internal secretions from those organs or tissues, and though in some instances a certain measure of progress has been made, and a certain amount of benefit has accrued, that system is still in its infancy, and strangely enough there is not a single disease of secreting organs, whether internally secreting, or externally, among the many to which flesh is heir, which has responded in the same manner, and to the same degree as myxœdema and its allied conditions to treatment by thyroid extract.

Medicine is not so simple a science that the key to one complaint will unlock the whole mystery of a score or more of others, though it may suggest a possible pattern for the intricate wards of some other required key.

Diseases are like fortresses, and the capture of any one indicates only some general plan of operations, but each separate fort must be attacked by a method peculiar to itself; and can only be taken by careful observation and persistent search for the one obscure avenue of entry to the otherwise impregnable citadel. And the young doctors of today are facing many such positions. A lasting distinction, with supremé personal satisfaction, awaits the man who captures one of them, for worthy to rank among the greatest benefactors of our race is he who finds a real remedy for any malady of mankind..

SEVEN CASES OF LABYRINTHITIS, WITH SIX OPERATIONS ON THE LABYRINTH.

By **M. A. Reid, M.B., Ch.M. (Ed.), F.R.C.S. (Ed.), and M.E. Lynch, M.B., Ch.B. (Melb.),**
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Case I.—D.F., male, aged 34 years, was admitted on June 14, 1916, on account of bilateral otorrhœa of long duration. The patient had had vertigo, nausea and otalgia in the left ear for one week. There was tenderness over the mastoid process. The left tympanic membrane was destroyed; the malleus was present, but displaced, while the head of the stapes was visible *in situ*. There was coarse spontaneous nystagmus to the right of the third degree. On standing, the patient fell to the left side, when facing forwards, varying with the position of the head. "Pointing by" of the left hand to the left was noted. There was no error with the right hand.

The patient's hearing was doubtful, no exclusion apparatus being available. The pupils were normal. There was no inco-ordination ataxia. Diadokokinesis was absent. The patellar and Babinski's reflexes were normal.

The caloric reaction with hot water was normal on the left side. Nystagmus to the left developed in 30 seconds. The fistula test was unreliable in the presence of a third degree spontaneous nystagmus. The temperature was 97.8° F. The pulse-rate was 80. The diagnosis of serous induced labyrinthitis was arrived at. It was not clear whether the affection was diffuse or circumscribed, owing to the unsatisfactory hearing test.

On June 15, 1915, a radical mastoid operation was performed. The *foramen ovale* was found to be intact. The surface of the external semi-circular canal was roughened; there was no fistula. No ex-

posure of the *dura mater* or of the lateral sinus was made.

On the 16th, the temperature was normal. The patient heard the voice through the bandage tested without an exclusion apparatus. The nystagmus was still present to the right, but was only of the first degree. There was less vertigo. This symptom continued to diminish, and was absent after the 18th. On the 24th walking and standing was performed without difficulty. The nystagmus on this date was very slight. On the following day the "after-nystagmus" following rotation to the right (clockwise) lasted 25 seconds, while the "after-nystagmus" produced by rotation to the left (counter-clockwise) also lasted 25 seconds. There was no longer any spontaneous nystagmus on July 6, 1915. The patient heard conversational voice at two feet with the left ear. The cavity was healed.

Case II.—C. McC., aged 25 years, was admitted on November 6, 1915. He had undergone a radical mastoid operation on the right side at 7 years of age. The discharge had never ceased. Three months before admission severe vertigo had set in and the patient frequently fell. There was apparent horizontal movement of objects. No vertigo had been complained of during the period immediately before admission, but he had slight headache and nausea.

The temperature and pulse were normal. On examination an adherent depressed cicatrix was discovered. The meatus and the mastoid cavity were filled with pus and cholesteatoma. There was no spontaneous nystagmus. There was slight "Rhombergism," with a tendency to fall to the right side. The fundus of the eyes were normal. The caloric reaction on the right side was negative. On the left side nystagmus was induced in 50 seconds. The fistula symptom was absent. Rotation to the right induced "after-nystagmus" to the left, of 10 seconds' duration. Rotation to the left induced "after-nystagmus" to the right, also of 10 seconds' duration. No signs of neurological lesions were elicited.

On November 10, 1915, a mastoid operation was performed. There was extreme erosion of the mastoid cells, which were filled with cheesy mass (cholesteatoma). The sinus canal was eroded over a wide area. The posterier meatal wall had been destroyed to a great extent. The sinus was shrunken, hard, fibrous and discoloured. The *dura mater* was not exposed either at the roof of the antrum or at the attic. The facial nerve was exposed for a considerable distance. Two separate fistulæ were discovered in the external semi-circular canal, both of which admitted a probe. On opening the external canal the bone cracked and a further exposure of the facial nerve resulted. There was no evident injury to the nerve. Three-quarters of an inch or more of the nerve lay exposed. The vestibule was opened through its roof, but no lower opening was made into either the vestibule or the cochlea, owing to the difficulty with the facial nerve, which was sagging down over the *foramen ovale*. As the patient's temperature was normal and as there was no toxæmia, the sigmoid sinus was not opened. It appeared to be completely fibrous. A culture was made from the contents of the mastoid cells. Gram-negative bacilli were obtained. They were apparently Friedländer's bacilli.

There was slight facial paresis for only about a week after the operation. The temperature remained normal. On March 7, 1916, the cavity was completely epithelialized, and there was no discharge.

Case III.—D.Q., aged 29 years, was admitted on July 13, 1915. He complained of suppuration of the left ear of long standing. Three weeks previous to admission there had been severe vertigo. He stated that he "fell in all directions." Headache and nausea were also complained of. On examination it was found that no vertigo was present. There was a large polyp in the left meatus. The right tympanic membrane was normal. The left ear heard a loud voice *ad concham* with Barany's apparatus with the right ear. On the right side the hearing was normal, but there was slight spontaneous nystagmus to the left. The caloric re-action was distinct on both sides. Rotation to the right induced "after-nystagmus" to the left of 10 seconds' duration. Rotation to the left induced "after-nystagmus" to the right of 15 seconds' duration. The "reversed" fistula symptom was present. It was marked, but was only elicited on decompression (cholesteatoma and polyp).

On July 14, 1915, a radical mastoid operation was carried out. The antrum was found to be filled with cholesteatoma and a polyp was seen attached to the promontory. The surface of the external semi-circular canal was worm-eaten. No fistula large enough to admit a probe was discovered. The *foramen ovale* was intact. No exposure of the *dura mater* or of the sinus was made.

On August 13, 1915, the caloric reaction on the left side was negative. Rotation to the right induced "after-nystagmus" to the left of from 5 to 7 seconds' duration. Rotation to the left induced "after-nystagmus" to the right of 20 seconds' duration. The fistula test was negative. There was no perception of sound by the left ear.

On September 8, 1915, labyrinthectomy was performed. The area of the external semi-circular canal, which had been regarded as suspicious, admitted a probe into the vestibule without difficulty. The canal was opened up backwards as far as the posterior canal, which was also opened. The roof of the vestibule was removed, and the stapes was also taken away. The cochlea and vestibule were opened below the *foramen ovale* in the usual manner. The vestibule was filled with granulation tissue.

On the day following the operation there was fine rotatory nystagmus to the right side. The temperature and pulse were normal. No facial paresis was present.

Slight facial paresis appeared on the 13th. The *orbicularis* and the *frontalis* muscles were active. This condition had not been present on the day preceding. There was still slight nystagmus to the right. The facial paralysis was complete on the 24th. On October 1, 1915, the facial paralysis was improving, and on the 5th it had disappeared completely. The cavity had filled up with fibrous tissue by the 15th. There was then no discharge and no nystagmus.

Case IV.—A.H., aged 18 years, was admitted on March 3, 1916, on account of suppuration of the left ear of 10 years' duration. A year before, he had had severe pain with vertigo; this had continued for three weeks. He could not stand without falling. No vertigo had been present since that date. The patient had had severe pain in the left ear for a week prior to admission. The left mastoid region was tender. The meatus was full of pus, and the walls were swollen. The left tympanic membrane had a perforation in the lower posterior segment. The right tympanic membrane was normal. The temperature was 101.6° F., and the pulse-rate 104. The tongue was furred, and there was some headache. Slight neck rigidity was detected. The patellar and Babinski's reflexes were normal. A slight degree of hyperæmia of the right and left discs was seen. The caloric reaction was prompt in the right ear, but absent in the left. Rotation to the right induced "after-nystagmus" to the left of 12 seconds' duration. Rotation to the left induced "after-nystagmus" to the right of 25 seconds' duration. The hearing in the left ear when Barany's apparatus was used was absent. Weber's tuning fork test was to the right side.

On March 5, 1915, a radical mastoid operation and labyrinthectomy were performed. Pus was found in the mastoid cells and antrum. The tympanic cavity contained cholesteatoma. The posterior meatal wall was eroded at the aditus. The *tegmen tympani* and the *tegmen antri* were intact. The lateral sinus was not exposed.

A fistula was discovered in the external semicircular canal on the floor of the aditus. A probe was passed through it into the vestibule. The stapes and other ossicles were absent. The Fallopian canal was intact. As the fever was not explained by the condition found, the posterior cranial fossa was opened. A large accumulation of pus was found. This accumulation was extra-dural and the membrane was separated from the bone. It had a very offensive odour. On culture a Gram-negative bacillus (Friedländer) was discovered.

The external semicircular canal was traced backwards as far as the posterior canal, which was opened. The roof of the vestibule was removed. The usual opening into the vestibule and cochlea was made from below.

Healing was uneventful for the first 19 days after the operation, when a facial paresis appeared. It was slight at first, but rapidly became complete. There was also severe neuralgic pain over the whole area supplied by the fifth cranial nerve on the left side. The facial paresis had disappeared by April 15, *i.e.*, 41 days after the operation. The cavity was not quite healed up, and some pus was discharging. The temperature had remained normal from the time of the operation.

Case V.—O.F., female, aged 17 years, was admitted on April 9, 1915, on account of discharging ears. A radical mastoid operation on the left side had been performed 1½ years previously. The left ear was still discharging, and the meatus was cicatrized. The caloric reaction and the fistula test were both negative. There was no perception of sound on the left side.

The cavity was reopened on April 24, 1915. The sinus had been exposed at the former operation. It was covered by healthy granulations. A fistula into the external semi-circular canal near the ampullary end admitted a probe into the vestibule. The Fallopian canal was intact. A modified Neumann's operation was carried out.

On the following day there was marked rotary nystagmus to the right, but none to the left. Slight vertigo was complained of. Four days later the nystagmus and vertigo had passed off. Healing proceeded without delay subsequently.

Case VI.—E.C., a male, aged 51 years, was admitted on November 9, 1915, on account of a discharge from the right ear of nine weeks' duration. There had been severe vertigo for seven weeks. The left tympanic membrane was normal. A large polyp was found in the right auditory meatus. There was no spontaneous nystagmus. Pressure with the finger on the tragus produced violent horizontal nystagmus. Rotation to the right induced "after-nystagmus" to the left which lasted 25 seconds, while rotation to the left induced nystagmus to the right, which was of the same duration. Conversational voice was heard by the right ear at three feet. Schwabach's reaction was positive on the right side. Weber's tuning fork test was referred to the right ear. Rinne's air conduction test was negative.

The temperature was normal, and there were no indications of any intracranial complications.

A radical mastoid operation was performed on November 10, 1915. Cholesteatoma was found in the antrum. The *dura mater* was exposed over a small area of the middle fossa. It appeared to be normal. A polyp was found in the tympanic cavity. The Fallopian canal was eroded above the *foramen ovale*. There was distinct facial twitching on swabbing at this point. A long, narrow fistula was found in the external semi-circular canal. The radical operation was completed, and the wound closed. The labyrinth was not interfered with, as it was functionally active.

On November 15, 1915, headache and nausea were complained of, but there was no spontaneous nystagmus. The temperature was 102° F., and the pulse rate 80. The reflexes were normal. Staphylococcus aureus and streptococcus were recovered by culture from the mastoid.

On the following day the right labyrinth was not responsive to the caloric or fistula tests. Headache and sleeplessness occurred on the 19th. There was persistent fever and loss of function of the labyrinth. The wound was therefore re-opened. The facial nerve was found to be sagging and exposed. The stapes was absent and the *foramen ovale* open. A probe passed readily from the fistula in the canal through the *foraman ovale*. The external semi-circular canal was traced backwards and the posterior canal opened. It was thought that a drop of pus exuded from the upper cut end of the posterior canal. The roof of the vestibule was removed, but the cochlea was not opened, as there was much difficulty with the facial nerve.

On November 20, 1915, the temperature was 99° F. There was slight facial paresis and spontaneous nystagmus to the left. No headache was complained of.

The facial palsy had disappeared completely by December 14, 1915. There had been no fever or headache after the second operation. Healing took place uneventfully.

Case VII.—Allan H., a male, aged 20 years, was admitted on December 14, 1915, with a history of chronic right-sided otitis media of twelve months' standing. In the lower part of the right tympanic membrane there was a large perforation. The ossicles were present. The caloric reaction was prompt and was attended by vertigo. (No note appears to have been taken in regard to the fistula test).

On the 22nd a radical mastoid operation was performed by one of us (M.E.L.). No fistula was detected. The temperature varied around 102° F. for some days. There was nystagmus to the right and to the left. This was regarded as being probably physiological.

The patient was still febrile on January 13, 1916. There was slight spontaneous nystagmus to the left, but none to the right. Vomiting, headache, sleeplessness, and some rigidity of the neck were present. The discs were hyperæmic. The caloric reaction on the right side was absent. On the left side it lasted for 60 seconds. Rotation to the right induced "after-nystagmus" to the left of 18 seconds' duration, and rotation to the left induced "after-nystagmus" to the right of 10 seconds' duration. The fistula test was negative. Loud shouts were not heard on the right side when Barany's apparatus was used.

On January 14, 1915, labyrinthectomy was performed. The usual tracing out of the external semicircular canal was done. The posterior canal was opened; the vestibule was opened through the roof, and an opening was made from the *foramen ovale* to the *foramen rotundum*. The vestibule contained organized granulation tissue. The stapes was absent and the *foramen ovale* was patent.

On January 17, 1915, the temperature was declining gradually. There was no vertigo, headache or vomiting. The patient took his food and felt better. There was still some spontaneous nystagmus, and rotary nystagmus to the left. Recovery from this date was uneventful.

These seven cases occurred among about 200 cases of chronic otitis media under our care in 12 months. In all cases Neumann's operation was adopted more or less completely. The exposure was not completed as far as the internal auditory meatus. This would seem unnecessary in the majority of cases, and indeed Neumann does not do it, unless there are indications of intra-cranial trouble.

The indications for opening the labyrinth on which we have acted are those laid down by Ruttin, viz.:—That so long as the labyrinth responds to any one of the clinical tests, caloric, rotation, or fistula test, a radial mastoid operation only should be done. When all tests fail to stimulate the labyrinth it should be opened. The reason stated for this position is that as long as the labyrinth is functional, it may heal, and in any case will fail to respond to tests some days before intra-cranial complications arise. When it is non-functional no further warning will precede the onset of such complications. Some of the cases recorded above were instances of circumscribed labyrinthitis with active labyrinths whose function failed after a radical mastoid operation. This was followed in two cases (VI. and VII.) by definite meningeal symptoms which were completely relieved by drainage of the labyrinth. Others were examples of latent suppurative diffuse labyrinthitis on admission, and had mastoid and labyrinth operation done at the same time. In one case (IV.) an extra-dural abscess in posterior fossa developed. This was apparently due to an extension of the process through the labyrinth, as there was no other erosion of the floor of the cranial fossæ and no involvement of the sinus.

The most generally applicable clinical test is the cold caloric. It may be interfered with by the presence of polypi or cholesteatoma, and in one case was inapplicable on account of the presence of spontaneous nystagmus of the third degree. Here it was replaced by the hot water. The rotation test may be debarred by the general condition of the patient, but it should be used as a routine to confirm the result of the caloric test, and to indicate the presence of compensation. Compensation must always be kept in mind in using the rotation. In the case of a healed functionless labyrinth the after nystagmus may be equal for both sides, though it is always markedly shortened. The fistula test is the most powerful stimulation of all, and is often retained for a time after both caloric and rotation tests fail to call forth a response.

The "typical" fistula symptom is that on compression there is either a quick nystagmic movement to the diseased side or less often only a slow movement to the healthy side. On decompression the reverse occurs, viz., nystagmus to the healthy side, or slow movement to the diseased side.

Only decompression produced the nystagmus in one of our cases. It is said that in the presence of a mass of cholesteatoma lying against the fistula decompression would have more effect than compression. In this case the fistula did not at this time admit a probe, and was probably a mere fissure. The "reversed or atypical" fistula symptom occurs less frequently. The reaction is in all respects the reverse of the "typical." The explanation suggested by Ruttin is that here the position of the fistula is such that the endolymph current produced is in a direction away from the vestibule. In five of our cases a fistula was evident in the external semicircular canal and in the sixth the *foramen ovale* was obviously patent.

One case (I.), the only one in which a labyrinth operation was not done, was an example of serous induced labyrinthitis, probably circumscribed. In the absence of an exclusion apparatus at the Hospital at that time the cochlear function could not be tested satisfactorily. A moderate amount of hearing was recovered in this case. This case required differentiation from a cerebellar lesion. The following features appeared sufficient.

The nystagmus did not vary in character. It decreased steadily from day to day. The direction of falling varied according to the position of the head, and was always in a direction opposite to the nystagmus.

All our patients made good recoveries. Facial paresis of short duration occurred in the majority of the operated cases. It would seem that the danger of injuring the nerve during the operation, if reasonable care and good lighting are used, is much less than might be expected. The risk of paresis, occurring from 48 hours to 19 days later, is considerable. These cases cannot be due to direct injury, and are probably due to serous exudation into the canal or from ostiitis spreading from the injured bone in the neighbourhood.

We attribute the paresis which occurred in one case, on the 19th day after operation, to cicatrization, involving the nerve probably at the internal auditory meatus, a large posterior fossa abscess having existed. In all cases the paralysis has completely disappeared within one month without special treatment. It will be noticed that in no case did a rise of temperature take place from an incomplicated labyrinthitis. It would seem, as has been pointed out by the Vienna school and by J. S. Fraser, that neither a mastoiditis nor a labyrinthitis, at all events in adults, will give rise to fever unless a complication co-exists. The appearance of slight temporary nystagmus to the healthy side after ablation of a labyrinth, which showed no reaction to clinical test, is taken to indicate that some remnant of functional activity exists which the tests are not sufficiently delicate to reveal.

The caloric test consists in douching the ear with a continuous gentle stream of cold water at a temperature of about 70° F., while the patient sits upright with the eyes directed to the side opposite to that syringed. The time required to induce nystagmus is noted. If no nystagmus is induced in two minutes the test is considered to be negative. Nystagmus is normally induced in about 25 seconds, and is, of course, in a direction opposite to that of the side syringed.

If hot water of a temperature of about 110° F. be used, the nystagmus induced is in direction to the same side as that syringed.

The rotation test consists in rotating the patient sitting upright with the eyes closed in a revolving chair. Ten rotations are employed in a period of 20 seconds. On ceasing to rotate the patient opens the eyes and directs them to the side from which he has been rotated. The nystagmus normally induced is in the direction from which he has been rotated, and its duration from the cessation of rotation is normally about 25 seconds.

Barany's apparatus is a noise producer used in the ear whose hearing is not being investigated. This is done in order to exclude the perception of the noise from this ear.

Reports of Cases.

A CASE OF ACUTE CEREBRO-SPINAL MENINGITIS.[1]

By **Keith Inglis, M.B., Ch.M. (Syd.),**
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While stationed at the Bathurst Military Camp, several cases of acute cerebro-spinal meningitis came under my notice, and one of these, I think, is of special interest as regards the treatment of the disease.

[1] Read at a Meeting of the New South Wales Branch of the British Medical Association on October 27, 1916.

The patient to whom I refer was a sergeant in the Australian Imperial Forces, and was 22 years of age. He first came under my notice on August 3, 1916, at 2 p.m., with a history of perfect health until the previous night, when he had suffered from "headache and shivering fits." A well-marked erythematous rash and small scattered petechial hæmorrhages were to be seen on the back and limbs.

He was carefully examined on several occasions during the afternoon of August 3, and the signs and symptoms he presented were so suggestive of meningitis that it was decided to perform lumbar puncture.

At 7 p.m. this was carried out under ether anæsthesia administered by the open method, and 65 c.cm. of cerebro-spinal fluid were allowed to escape, and 30 c.cm. of antiserum (Parke, Davis & Co's) were introduced intrathecally.

The cerebro-spinal fluid was quite clear, and did not become cloudy, even when heated.

Although comparatively little anæsthetic was administered, there was a moderate amount of salivation, but not more than is frequently observed during ether anæsthesia.

I left the patient, feeling satisfied that the routine procedure recommended for cases of this kind had been very successfully carried out.

At 9 p.m. the sergeant in charge of the Army Medical Corps reported that everything was satisfactory, and that the patient said he felt "all right."

At 11.45 p.m. I received an urgent call, and when I arrived I found that the patient had just succumbed. Profuse white lather was flowing from his mouth and nares.

This sudden fatal termination was quite unexpected, as in other cases which had seemed just as severe as this one from a clinical aspect, and in which exactly the same treatment had been employed, no ill-effects had been experienced.

The autopsy revealed an abundant fibrino-purulent exudate around the vessels in the meshes of the pia-arachnoid, especially in the sulci on the vertex of the brain. The lungs showed an acute, frothy, œdematous condition.

Two interesting points, I think, are raised by this case.

(1) Is a general anæsthetic contra-indicated?

There are many cases of the disease, *e.g.*, in children, in patients with delirium, and in unusually sensitive or nervous individuals, in which lumbar puncture without a general anæsthetic would be very difficult.

What then is the anæsthetic of choice?

Several similar cases at the camp were punctured under ether anæsthesia with no ill-effects, and I still consider ether the anæsthetic to be preferred.

(2) This case convinced me that it is possible for a marked degree of inflammation of the meninges of the brain to be present, even though the fluid obtained by lumbar puncture is quite clear. This, I think, is a most important practical point.

A patient with clinical signs suggestive of meningitis is, nowadays, subjected to lumbar puncture with a view to obtaining corroborative evidence from the cerebro-spinal fluid. If the fluid is turbid this can, for all practical purposes, be regarded as sufficiently conclusive to warrant the administration of antiserum.

But if the fluid is clear, can any conclusions be drawn? Is the amount of fluid obtained, or the rate at which it escapes, of any practical significance?

The case I have just reported yielded only 65 c.cm. of clear fluid at the initial puncture, and yet at first the fluid flowed out as a continuous stream.

The mildest case, from the clinical standpoint, that occurred at the Bathurst Camp yielded 110 c.cm. of clear fluid at the first puncture, and it escaped in separate drops from the beginning.

An immediate diagnosis, after considering the clinical signs and examining the cerebro-spinal fluid, is imperative in all cases. To wait for a confirmatory bacteriological report would mean the loss of several days of valuable treatment.

So far as my limited experience goes, it would appear safer to give antiserum from the start in all cases where the clinical signs are strongly suggestive of meningitis,

even if the cerebro-spinal fluid be clear, provided that the fluid seems to be unduly abundant or under increased pressure.

Reviews.

THE INVOLUNTARY NERVOUS SYSTEM.

The monograph on "The Involuntary Nervous System," by the late Walter Holbrook Gaskell[1] forms the initial volume of a series of treatises by English investigators dealing with particular branches of physiology. The general editor of this series, Professor E. H. Starling, points out in his preface that advancement in any science is not at any time widespread. Some sections of the line are pushed forward, while other parts are allowed to remain for years with little movement, until they are able in their turn to progress through the support extended by the advance in other sections. It is only fitting that this first volume should come from the hand of one whose work and ideas dominated for years the labours of many English physiologists. The author died a few days after revising the various chapters of this book. His son has preferred not to alter some few paragraphs that had not been satisfactorily written. The diagrams had been prepared and approved and Dr. J. F. Gaskell has supplied the descriptions for them. The references had not been collected and arranged. They have been left incomplete. Since 1874, when Gaskell went to Leipzic with the intention of working on problems connected with the sympathetic system, his thoughts had been occupied with the elucidation of the innervation of the involuntary muscular systems. During the last hours of illness he said that his book represented fairly accurately his views on the problems to which he had devoted his life.

When Gaskell began his studies, the conceptions of the nervous system put forward by M. F. X. Bichat, in 1801, appeared to be based on the strongest foundation of facts. Two principal nervous systems existed in every vertebrate: the cerebro-spinal regulating the organs of locomotion and the external sense-organs, and the sympathetic controlling the nutrition of the body. Each of these systems was assumed to be automatic and capable of exercising independent functions. A separate class of nerve fibres, non-medullated in structure, was characteristic of the sympathetic innervation. The *rami communicantes* were considered to form a reciprocal connexion between the organic or sympathetic and the animalic or cerebro-spinal centres. The movements of the heart and intestines were supposed to be initiated and governed by their self-contained ganglia. By cutting serial sections through the *rami communicantes* and through the roots of the segmental spinal nerves, Gaskell saw the main mass of the non-medullated nerve fibres enter the trunk of the spinal nerve and travel towards the periphery, while a small number passed towards the spinal cord along the nerve roots. These fibres were traced into the membranes around the spinal cord, where they terminated in the walls of the blood-vessels. None of them entered into the spinal cord itself. It became evident that the reciprocal connexion with the spinal cord did not exist, and that the characteristic non-medullated sympathetic fibres were peripheral nerves.

Just at this time, the embryologist, Onodi, announced that the nerve cells of the sympathetic chain were derived from a mass of cells that came from the side of the central nervous system. A portion of this mass gave rise to the posterior root ganglia, while the remainder travelled laterally to give rise to the sympathetic trunk. Gaskell appreciated at once the importance of this observation on the essential unity of the sympathetic system with the cerebro-spinal system. Continuing his microscopical examination of the roots of the spinal nerves, Gaskell noted that the anterior root of the second dorsal nerve was composed almost entirely of fine, medullated nerve fibres that passed along the white ramus to the sympathetic chain. He found, further, that similar fine, medullated nerve fibres were present in the roots of the thoracic and upper lumbar nerves. Their distribution, in fact, corresponded to the region of white *rami communicantes*. Above and below there were only grey *rami communicantes*, the white were absent. This peculiarity of the roots of the thoracic nerves was thus explained. The white *rami communicantes* were the efferent fibres of the central nervous system passing to the sympathetic system. Already aware that the accelerator fibres of the sympathetic ganglia to the heart were not medullated and that the speed of the heart could be increased by stimulation of the roots of the second and third dorsal nerves, Gaskell recognized that the accelerator fibres passed from the cord as medullated fibres to the stellate ganglion, where they lost their medullated sheaths and came into connexion with the sympathetic cells which gave origin to the non-medullated fibres passing to the heart. By similar reasoning Gaskell showed that the whole group of vaso-constrictor nerves leaves the cord as medullated fibres and passes to the blood-vessels as non-medullated fibres derived from sympathetic cells. Ever ready to adopt general conclusions, Gaskell, as early as 1895, regarded the sympathetic system as consisting largely, if not entirely, of efferent nerve fibres to the peripheral organs.

This idea, based mainly on the results of a microscopical investigation, was confirmed and extended by the experiment of Langley and Dickenson with nicotine. The injection of nicotine prevented the effects of stimulation of the fibres from the spinal cord which pass to the sympathetic ganglia along the white rami, but did not affect stimulation of the fibres arising from the ganglia. In other words, nicotine affected the sympathetic cells or the junction between the spinal fibre and the sympathetic cell. The fibre passing from the spinal cord to the ganglion was called by Langley "preganglionic," while the sympathetic fibre was named "post-ganglionic."

The ganglia belonging to the sympathetic system may be separated into two distinct groups. A chain of ganglia lies along the vertebræ on each side, constituting the vertebral or lateral ganglionic chain. A series of ganglionic masses is found on both sides of the abdominal aorta, forming the prevertebral or collateral ganglia. The collateral ganglia are arranged into two parts. The anterior portion lies in close relation with the cœliac axis, and is divided into two groups, the semilunar ganglia and the superior mesenteric ganglion. The fibres from the semilunar ganglion are distributed with the blood-vessels of the stomach, liver and spleen, while the fibres arising from the superior mesenteric ganglion run with the artery of that name, and are concerned with the innervation of the small intestine and its blood-vessels. The small posterior collateral ganglionic mass lies on the inferior mesenteric artery, is known as the inferior mesenteric ganglion, and is concerned with the innervation of the large intestine and its vessels. A number of small, separate ganglionic masses are found in connexion with the kidney and genital organs. The collateral ganglia are all connected with the spinal cord by the splanchnic nerves. These nerves are the *rami communicantes* to the prevertebral ganglia. Under the older conception, the splanchnic nerve were supposed to connect the lateral and the collateral sympathetic ganglia. To Langley is due the credit of showing that the lateral and collateral ganglia are not connected, and that there are no association fibres between the different ganglia of the lateral chain. Connecting fibres which control the interaction of separate parts of the central nervous system appear, therefore, to be absent from the sympathetic system.

The sympathetic system seems to be a system of efferent fibres mainly distributed to unstriped muscle fibres and derived from the dorsal and upper lumbar regions of the spinal cord. The nerve supply to plain muscle differs from that to striped muscle, in that a nerve cell is interposed in the path from the cord to the muscle cells. Afferent fibres exist, however, in the sympathetic nerves, and pass from the rami into the posterior root ganglion. These afferent nerve fibres differ in no way from those of the cerebro-spinal system. They are in connexion with the

[1] The Involuntary Nervous System, by W. H. Gaskell, M.A., M.D., F.R.S.; Monographs of Physiology, 1916. London: Longmans, Green & Co.; 8vo., pp. 178, with 8 coloured figures. Price, 7s. 6d.

motor nerve cells of the sympathetic ganglia only by way of the central nervous system.

Microscopical examination of the sacral spinal roots revealed to Gaskell fine, medullated fibres passing out in these roots for distribution to the bladder and large intestine. No fibres could be found in the cervical spinal roots, but many groups of these fibres entered into the pneumogastric nerve. These fibres are widely distributed to the stomach and intestines as far as the ileo-colic valve. Stimulation of these sacral or bulbar nerves leads to contraction of the plain muscles in the organs respectively supplied from sacral or vagal sources. The use of nicotine reveals the presence of nerve cells on the path to the periphery, the cells lying in the walls of the organ supplied by the preganglionic nerves. There are therefore three main outflows of fine, medullated fibres to peripheral motor ganglia, the bulbar, the thoracico-lumbar and the sacral parts of the involuntary nervous system. These three portions are separated roughly from each other by the nerve plexuses to the upper and lower limbs.

The efferent fibres which travel from the central nervous system into the involuntary system are only in part motor fibres to plain muscle cells. Some of them seem concerned with the inhibition of muscular contraction, while other fibres stimulate the secretion from glands. The motor fibres of the thoracic region belong to the vaso-dermal system, and are distributed to the heart, to the blood-vessels of the whole body, to the musculature of the sweat glands, to all unstriped muscle found just beneath the skin of the entire body, whether the muscle is pilo-motor or not, to the plain muscle found in relation with all the structures formed from the segmental uro-genital duct, and to the sphincter muscles of the caecum, rectum, bladder and urethra developed from the primitive cloaca. The motor fibres of the bulbar region supply the muscular layers in the wall of the alimentary canal from the œsophagus to the end of the intestine at the ileo-colic sphincter, while those from the sacral region supply the muscle fibres of the large intestine and bladder, excluding the sphincter muscles.

The inhibitory fibres of the thoracic region pass to the muscle fibres of the small intestines and of part of the stomach. The muscles of these parts are supplied with a reciprocal nervous mechanism. The vagal nerve carries motor fibres which are effective through the cells of Auerbach's plexus, while the splanchnic nerves carry inhibitory fibres which end in the superior mesenteric ganglion. Post-ganglionic fibres pass from the ganglion into the gut. These fibres when stimulated have been shown by Elliott to give rise to inhibition. The fibres seem thus to be inhibitory in the whole of their course, and to arise from "inhibitory" nerve cells. The inhibitory fibres of the sacral region pass to the sphincter muscles of the bladder and rectum. The vagus supplies inhibitory fibres to the heart. In all these cases a reciprocal innervation is present, derived from different regions of the central nervous system.

In addition to the detailed account of the distribution of the fibres of the involuntary nervous system to the different regions of the body, Gaskell deals with the rhythmic and peristaltic movements of involuntary muscle in a chapter in which the myogenic and neurogenic origin of the heart-beat is debated, and in which a most valuable account of the movements of the small intestines is included. In another chapter he discusses the pathway of the nerves which cause the secretion of duct-bearing glands. The efferent neurones for these glands lie outside the central nervous system, and belong to the involuntary nervous system. In the case of the salivary glands, a reciprocal innervation can be recognized, but in regard to the majority of glands not sufficient information has been collected for any useful discussion. The final chapter deals with phylogenetic origin of the sympathetic nervous system, and is coloured by the author's views as to the origin of the central nervous system of vertebrates from the alimentary canal of primitive *Palaeostraca*, forms which were neither crustaceans or arachnids, but which gave rise to both groups.

Gaskell also believed that the voluntary and involuntary nervous system are built on the same plan. The nervous mechanism of each spinal segment consists of an afferent neurone, which is connected with a sensory end-organ, of a motor neurone, passing from the cord to striped muscle, and of a connecting neurone, which brings these neurones into relation with each other, to complete the reflex arc. Gaskell believed that the involuntary system was arranged in the same way. The afferent fibre passed by the posterior root into the cord, the connecting neurone was represented by the preganglionic fibre, while the motor neurone was replaced by the fibre derived from the sympathetic ganglion. While this hypothesis has the virtue of simplicity, and affords an easy method of explaining the structure of the involuntary nervous system, it does not seem to be in accord with some well-known physiological observations on the union of nerves. Langley showed that somatic spinal nerves could be joined to preganglionic fibres of the sympathetic. Thus the vagus can be joined to the cervical sympathetic trunk in the neck when it makes a functional union. Stimulation of the vagus will then dilate the pupil, constrict the blood-vessels of the ear and otherwise produce the effects of sympathetic excitation. The vagus will not make a functional union with the post-ganglionic fibres from the superior cervical ganglion passing either to the blood-vessels of the ear or to the pupil of the eye. Pre-ganglionic and not post-ganglionic fibres seem thus to be homologous with somatic efferent fibres.

The coloured diagrams with which the book is illustrated will repay careful study. Some of them are original, and convey their information with much ease. The work will remain a summary of the views of one who had a profound influence on our conceptions of the physiology of man. It will be read with profit by all who take any interest in the progress of knowledge on the function of the human body.

Naval and Military.

The 244th list of casualties was issued on November 27, 1916, and contained the names of 54 officers and 829 men. The total number of men reported to be sick is 409. It is worthy of note that while 17 were killed in action, as many as 78 died of wounds. The only medical man whose name is mentioned in the list is Captain S. P. Lyttle, who has been wounded.

Two Military Crosses have been awarded to members of the Australian Army Medical Corps, for distinguished service. The details of the gallantry are not yet to hand. The first name is that of Captain Douglas Dunbar Jamieson, and the second that of Captain Jeffrey Hampden Vernon. We learn that Captain Ronald G. Orbell, of the New Zealand Army Medical Corps, has been awarded the Military Cross.

In congratulating our colleagues on having gained these distinctions we wish to express our satisfaction, at a somewhat late date, that His Majesty the King, on the advice of the military authorities, has recognized the immense value of the work accomplished in Egypt by Colonel H. C. Maudsley, and has decorated him with the Order of the Companionship of St. Michael and St. George.

His Excellency the Governor-General has been pleased to approve the promotion of Captain J. M. Mehaffy, Australian Army Medical Corps, to be Major. The announcement in the Commonwealth *Gazette* bears the date of November 1, 1916.

The appointment of Captain A. E. Ireland, Australian Army Medical Corps, has been terminated as from November 8, 1916.

The following medical practitioners have been appointed members of the District Medical Referee Board in the 2nd Military District, under Section 75 of the War Service regulations, 1916:—Drs. W. J. S. McKay, W. F. Burfitt, S. Sheldon, M. S. Veech, V. J. McPhee, P. Bolger, N. D. Royle, W. S. Brooks, G. Brooks, H. Marks, J. Flynn, M. F. Lidwill.

THE LAUNCESTON GENERAL HOSPITAL.

A deputation of members of the Tasmanian Branch of the British Medical Association waited on the Premier of Tasmania on November 15, 1916, for the purpose of putting the views of the medical profession in regard to the admission of well-to-do persons as patients to the Launceston General Hospital before him. Owing to want of space the full account of the statements made by the members and the reply of the Premier cannot be published this week. It is proposed to include them in next week's issue.

The Medical Journal of Australia.

SATURDAY, DECEMBER 2, 1916.

The Extent of the Sacrifice.

Long ago Australia endorsed the principle of sacrificing the last man and the last shilling, if necessity should arise, to achieve the ideal which the British Empire had accepted. The promise has been dishonoured by the reply to the question referred to the people. It has again been dishonoured by the illegal and disloyal action of the miners. If the ideal is not realized, Australia's share of responsibility will be greater than that based on the relative size of her population. Disaffection is contagious, and the example of the leaders of the "No" party and of the miners' union becomes dangerous, inasmuch as this example may be emulated in varying forms wherever discontent and unrest lies smouldering, ready to burst into flame on a slight provocation. The last man may find his safety at home imperilled long before the brave soldiers of the Empire have been withdrawn from the various fronts in Europe. The last shilling may be spent on food and necessaries of life at a price unnecessarily and wickedly enhanced as a result of the strike. It should be recorded to their honour that the doctors in Victoria and other States called a truce in the negotiations with the Friendly Societies until the end of the war, and have adhered strictly to the terms of that truce.

The members of the medical profession should not be used for combatant purposes in the war. All authorities are agreed in this respect. Every medical man is needed in some capacity as long as the war lasts, and when the whole profession is thoroughly organized, and each man is at the post at which he is most valuable, it will be found that hard work and some sacrifice are needed to keep the machine going. For the medical profession the call for the last man and the last shilling still holds good. The extent of the sacrifice that is required of each individual will vary greatly. Defaulters will lose the good opinion of their colleagues, and will incur the opprobrium of the community. The authorities are asking every medical man in the Commonwealth to enrol voluntarily in the Australian Army Medical Corps Reserve. The response up to the present leaves much to be desired. Those who hesitate may well consider what the effect would be to them if they acceded to the request, and they should consider the position of their colleagues. The Empire is at war, and this means that each citizen has his duty to perform to his King and country. The duty of the young and strong members of the medical profession involves much more than many older practitioners appear to realize. A combatant member of the army is exposed to great risk, and during an advance takes his life in his hands. Perusal of the list of casualties reveals that the majority escape injury, and that of those who are less fortunate, the majority receive slight wounds. But they have their weapons of offence, and are engaged in the uncivilized task of killing. The noncombatants have to perform their services in exposed positions and under conditions of indescribable hardship. Medical officers attached to regiments in action, those in the ambulances and in the advanced casualty clearing stations have the task of attempting to save life, or to alleviate suffering while messengers of death are in the air all round, while noise and commotion distract their attention, and while nerve-racking scenes are enacted under their eyes. These men work long hours, in any chance piece of cover, often in a dim light and in the uncanny environment of a discarded enemy trench. If the surgery at the front is not of a high scientific order, what wonder! Human beings could not work at high pressure and in such circumstances as these and yet retain a complete command over their critical and discerning abilities. Moreover, it must be remembered that by experience it has been found that only young men are able to stand the physical strain inseparably associated with the work. We commend to the notice of practitioners who have not a real grasp of the situation an eloquent article by Lord Northcliffe on "The War Doctors," which was published in the *Daily Mail* of October 6, 1916. The author is not quite accurate in some of his statements; he has been led astray at times by the unwonted awfulness of the situation, and has not been

able to discern between first-class work and the best possible under difficult conditions. But the description must send a thrill through the beings who, comfortably ensconced at home, learn for the first time, what the young members of the profession risk and endure for their country's cause. A financial sacrifice is not imposed on these men simply because as young graduates they have no money to sacrifice.

Compare this with the position of the medical practitioner who joins the Reserve. He may be asked to undertake a little work in addition to the ordinary routine work in his practice. In this case, there is no diminished income; no real hardship. Only the performance of an extra amount of work, with pleasant surroundings and an appreciative crowd of admirers, to whom he can sing his own praises. Or he may be mobilized for some other form of duty, or required to give up part of his day to act at a military hospital. At the worst, he may lose a portion of a good income and suffer some inconvenience in having to take up his quarters in some camp or institution. In many cases, if the response be general, he will be left alone to pursue his practice, and for the time may be earning a larger income, because he is doing two men's work. Why hesitate?

GRAPHIC LOCALIZATION.

In the issue of the *British Medical Journal* of September 30, 1916, there is an account of the work of Sergeant James Shearer, of the Royal Army Medical Corps. This work has attracted some attention in the Australian daily press, and both in the newspapers and in our contemporary in Great Britain the details are wrapped in some mystery, and the essence of the process is described in a tentative and incomplete manner. Shearer has utilized certain known facts in arriving at a practical method of localizing foreign bodies and pathological processes in internal organs. Unfortunately a full description of the apparatus employed and of its mode of application is not yet available, and it is therefore impossible to form more than a general idea of the principles underlying the process. In the description referred to it is stated that the inventor assumes that the tracings of outlines of organs, blood vessels and foreign bodies are obtained as a result of an electric field induced at the point of trans-section of two alternating electrical fields of equal strength. The potential force of this induced electrical field is released, and can be converted into dynamic power. We are inclined to regard all physical phenomena as marvellous and mysterious, until familiarity compels us to consider them as something self evident and obvious. No one appears to be surprised that sun or other forms of actinic light can penetrate glass. But when Röntgen demonstrated that other forms of light rays were able to penetrate other solid substances, the world marvelled. It does not appear to have occurred to the man in the street that the two phenomena were similar, and that in the case of the X-ray the power of penetration only differed in quality to the power of penetration of the actinic rays. In other words, we had regarded glass as transparent, but forgot that this property was demonstrable only when certain rays were present. Faraday demonstrated many years ago that the nerve-muscle preparation in the decapitated and pithed frog was still endowed with an obscure force, which was very similar, if indeed it was not identical, to electric force. Kölliker and Müller discovered in 1858 that the heart beat is accompanied by an electrical discharge, and this knowledge was later utilized by Einthoven for the purpose of producing graphic records of the electrical discharges. Shearer appears to have taken this knowledge a stage further, and to have utilized the fact that electro-magnetic waves are generated in all living tissue. For practical purposes it is permissible to regard these forces as electrical. It would seem that each form of tissue gives rise to an electric field of quality, and probably quantity, different from those of all other forms of tissue. Einthoven found that the electrical discharge of the heart beat is so small that an instrument of considerable delicacy is required to record its variations. It would, however, appear that the potential in the heart is greater than that in other organs and tissues, and consequently special means must be employed to effect any record of these at all. Shearer has further employed physical phenomena to achieve his ends. Two alternating electric currents of precisely equal strength are passed through the body, so that they

intersect each other in the organ to be delineated. As the waves generated by these currents are tuned in correspondence with the electric fields of the component tissues of the organ, and as the fields are of equal values, no influence is produced on the hammer needle unless the native electric force is present. It is impossible to determine what actually takes place until all the details of the apparatus and its effects are available. It is not even possible to form a conception of the manner in which the induced current is liberated or released and converted into dynamic force. It is, however, clear that the ingenuity of the inventor has led to an adaptation of a complex series of phenomena. This work is probably of greater value than its present application suggests. The possibility of graphic recording of electromotive forces inherent in the body opens vast fields for future research, and we may anticipate a time when variations in the physiology of functionating tissues may be depicted in a manner which will enable the physician to deal with them more scientifically and more exactly than is possible at present.

WHAT ARE FOODS MADE OF?

The belief that foods have an unvarying composition akin to the constitution of chemical compounds appears to be spread widely in medical circles. Even when the idea is not accepted in its strict form, it is held that the range of variation is not extensive. In consequence of this conception of the chemical composition of foods, it is customary in Australia to ascertain from tables in American and European text-books the amounts of proteins, fats, carbohydrates and ash found in any food, and the value of the energy liberated upon its combustion.

The diet of the people of the Commonwealth of Australia is mainly made up of animal and vegetable products, the composition of which is determined by the conditions of growth of plants and domesticated animals. Most of these products are mixtures of several food-stuffs. Cane-sugar is, perhaps, the only substance which can be purchased in a highly pure state from the chemical standpoint. Mixtures of fats in a comparatively pure form are sold as butter, dripping, lard and suet, and certain foods consist almost entirely of starch.

With regard to the construction of plants, it is well known how greatly the quantities of the components of the tissues are influenced by the characters of the soil, by the abundance of the rainfall and by the rate of growth. The constituents of the flesh of fish, fowl and beast are altered maybe to a greater extent by the weight and composition of the food. Not only so, but the general climatic conditions of one country may be so dissimilar from those of another country, that different races of stock may be bred, and unlike strains of cereals and vegetables cultivated. Since the climate of Australia is warmer than that of Europe, since its soil is the product of the devastation of a different series of rocks, it is only natural to expect that foods produced in Australia may show changes in composition from those of other countries. While most thoughtful persons will no doubt agree as to the existence of some degree of variation in the composition of Australian foods, only few will be in the position to judge as to the range of variation. Scientifically-trained persons will have noted how varied are the figures obtained in the analyses of the common articles of diet when the numbers found in analyses of the productions of different districts are compared together, or when analyses are made in the same district from time to time. Few figures are available on the composition of foods produced in Australia. Most of the information is hidden in the papers of laboratories and in private note-books. Little has been published in scientific journals.

A few examples will serve to illustrate the limits of variation in the composition of foods produced in Australia. Cow's milk, regarded by so many health authorities as of such uniform composition, shows much variation. Many who live in urban areas may use the milk supplied by large companies handling country milk in bulk. Such milk does not vary more than 20 % in composition from one month to another during the year. Other persons who use the milk from suburban dairies, or from farms and dairies in the country, may receive milk of very different composition from time to time. Thus, the heat value of three pints of milk, often prescribed as a daily ration to the sick and calculated as sufficient for milk of average urban composition, will be yielded by two pints of milk of best quality, or by four pints of poor milk such as is common in a cold, dry spring in Australia. The medical man who prescribes milk in Townsville will be ordering a different diet to the practitioner in Geelong who directs the use of the same quantity of milk. Bread is another article largely employed in making up a diet. The quantity of water in bread has been found to vary between 42 % and 44 % as the result of analyses of over a thousand loaves made in the Physiological Laboratory of the University of Sydney on bread baked in Sydney. In Melbourne the loaf does not contain more than 40 % of water. The amount of sugar and starch in Sydney bread does not vary more than 10 %, but the proteins vary considerably. The figures obtained show the amount of proteins to range from six to over 12 %. The loaves made in any year from the same season's flours do not vary more than 25 % in the quantity of protein, but the amount of protein from year to year in the bread may vary 100 %. Meat also has a very different food value, according to the amount of fat present.

In prescribing a dietary for patients, it is futile to weigh out the food in ounces, unless some knowledge is obtained of the quality of the actual food ordered. In accurate work the food prescribed must be analysed to ascertain its constituents, while in less accurate work the composition of food must be obtained from analyses of Australian products.

Abstracts from Current Medical Literature.

OPHTHALMOLOGY.

(196) Newer Principles in Cataract Operations.

Under the heading of "Major Principles," Derrick T. Vail discusses (1) preliminary iridectomy, and (2) the maturity of the cataract in relation to operation (*Archives of Ophthal*, July, 1916). The author has entirely abandoned the practice of preliminary iridectomy, convinced that it is founded on surgical sophistry or timidity. It is not devoid of risk, may complicate the subsequent extraction, and is unnecessary. On the subject of maturity, he maintains that immature cataract of any form can be successfully removed by several methods, and the results in large numbers compare favourably with the results of operations by the established method on mature cataracts. Therefore operate without waiting, if the vision is sufficiently bad. Under "Minor Principles" he discusses the following points: (a) Cleansing the eye for operation: It is wrong to squeeze the lids to evacuate the meibomian glands, as it wounds the epithelium, nor should the conjunctiva be rubbed with swabs. The best method is full and effective douching with saline solution or weak solutions of perchloride of mercury with the eyelids held away from the eye by Smith's speculum. (b) Controlling the lids during operation: The various methods in use seem to be about equally useful; still he urges the principle that the eyelids during the actual delivery of the lens should be held entirely off the eyeball and hung like a tent in order to take all weight and spasm off the eyeball, and thus prevent as much as possible vitreous escape during pressure to deliver the lens. (c) Dealing with the capsule. Failing the removal of the capsule entirely with the lens (the best method), at least the anterior capsule should be freely removed by capsule forceps. The cystotome should be discarded. (d) Retained lens substance: If the cataract is over-ripe retained lens débris must be got rid of; but clear cortical fibres left behind should be left alone, as they will absorb if the anterior capsule is out of the way. (e) Time as a factor: Time should be reduced as far as possible—3 to 5 minutes—to lessen the shock. (f) Atropine: Atropine, with rare exceptions, is a positive detriment at any stage after extraction. Some congestion is useful; atropine may bring on iritis in glaucoma.

(197) Hæmorrhages of the Vitreous.

A. W. Ormond's purpose in writing a paper on hæmorrhages of the vitreous was to discuss and, if possible, to improve upon the various means at our disposal of favourably influencing the absorption of blood in the vitreous (*Ophthalmology*, September, 1916). The fluid part is carried away by lymphatics and blood-vessels, the solid constituents are removed by leucocytes, and the fibrinous coagulation is invaded by fibro-blasts and converted into fibrous tissue. It is the contraction of this which constitutes the chief danger to the eye and the aim of treatment should be to promote absorption of the fluid and solid constituents of the blood as quickly as possible, and the minimum of fibrous residue. The means the author has employed are: Massage, ionization, sub-conjunctival injections, removal of fluid and substitution of normal saline fluid, fibrolysin, dionine, potassium iodide, and radium. Of these measures he considers that massage is the safest and best, but it is probable that some of the others influence the condition favourably. The removal of fluid and injection of normal saline solution and radium are of doubtful benefit.

(198) Sclero-corneal Trephining in Glaucoma.

W. H. Wilmer presents his experience of a limited number of sclero-corneal trephining for glaucoma, which, however, he has kept under observation. (*Archives of Ophthalmology*, July, 1916). The cases with complications are described in some detail, but as they are not numbered in the results tabulated, his impressions may be stated in general terms. After the first enthusiasm for the operation, the pendulum of professional opinion had a tendency to swing too far in the other direction. Many complications ascribed to trephining are common to other procedures. The danger of late infection may be lessened by dissecting up all the sub-conjunctival tissue and cleansing of the eye afterwards with boric acid or argyrol. Hæmorrhage may be lessened by precautions before the operation, such as decreasing excessive blood pressure, the use of miotics and avoiding general anæsthetics. Both eyes can be operated upon at the same time; the operation does not reduce the vision nor restrict the field. The author regards the operation as the easiest, safest and most effective in all cases of glaucoma except the acute form. A warning is given that valuable as the tonometer is, careful palpation should be practised, as all instruments are not equally reliable.

(199) Syphilitic Retino-choroiditis Juxta Papillaris.

Verhoeff reports the case of a patient a coloured man, aged 28, who, three months before, had been treated with salvarsan and mercury for primary syphilitic lesion of the tonsil (*Archives of Ophthalomology*, July, 1916). The sight became misty in the right eye, and there was marked pericorneal congestion. The globe was tender, the vitreous was filled with dust-like opacities preventing a clear view of fundus. The retina was completely separated. The eye was enucleated and showed a granulomatous lesion near the margin of the disc, and involving chiefly the inner layers of the retina and only secondarily the disc and choroid. The case was not unlike one the author had published previously, in which an abundance of spirochætes was found. Retino-choroiditis juxta papillaris was first described in 1909 by Jenner, who reported four cases. It occurred in healthy young persons without evidence of syphilis. Ophthalmoscopically there was seen a prominent infiltrate immediately above the papilla and obscuring the retinal vessels, which proved to be vitreous opacities. In a few months the infiltrate begins to be absorbed, leaving a pigmented, white spot. Recurrences may take place in the same area. Nineteen other cases have been recorded, but the ætiology is obscure; possibly some of the cases are syphilitic in origin.

(200) Rupture of the Eyeball and Disappearance of the Iris.

Sydney Stephenson records the case of a woman, aged 40 years, who, falling against a wooden cupboard, struck her left eye, with loss of sight (*Ophthalmoscope*, July, 1916). Two days later she was admitted to hospital with bruising around the eye, and a rupture in the ciliary region below and to the outer side of the cornea. The anterior chamber contained blood. Four months later the anterior chamber was deep, no trace of iris was to be seen, and the lens was slightly dislocated. The accident is very uncommon. The iris did not escape from the eye, but probably through rupture of the *ligamentum pectinatum*, slipped backwards on the sclera along with the ciliary body.

(201) Quinine Amblyopia.

Major Kirkpatrick reports the case of a lady, aged 30 years, who took half an ounce of quinine sulphate in mistake for Epsom salts (*Ophthalmoscope*, August, 1916). She was unconscious for 15 hours, and was then found to be blind and deaf. Her hearing was recovered after three days, and the sight slowly returned during three months, still leaving her blind at night. Seven months after the first onset the sight failed again to light perception. The nerve heads were found to be white, and a small mass of hyaline was seen overhanging the superior nasal artery in the left eye and the inferior nasal artery in the right eye. The retinal vessels were small. She was treated with strychnine, cyanide of mercury, and amylnitrite, and by means of Bier's suction glass. The condition improved somewhat.

LARYNGOLOGY AND OTOLOGY.

(202) Bilateral Laryngeal Abductor Paralysis in Tabes.

E D. D Davis (*Journ. Laryng., Rhin. and Otology*, September, 1916) recalls a discussion on the ætology of paralysis of the recurrent laryngeal nerve, which took place in 1913. Sir David Ferrier expressed the view that the paralysis

observed in tabes was of peripheral origin. Sir Felix Semon refused to accept this opinion, and called on laryngologists to record every post mortem examination which might throw light upon the subject. In following out this suggestion the author details the history of a man aged 36 years who had complained of dyspnœa for 11 months. The difficulty in breathing came on in attacks of a few seconds' duration. The patient had contracted syphilis six years previously. The diagnosis of tabes was confirmed by Mott. On examination of the larynx it was found that the vocal cords did not have any power of abduction. During deep inspiration a narrow chink was seen in front and behind the vocal processes. The condition of the larynx remained unchanged for six years up to the time of the patient's death. At the post mortem examination the vocal cords were found in a cadaveric position, and there were no signs of any abnormality. The lumbar spinal cord was in a condition of sclerosis as far as the posterior columns were concerned. There was atrophy of the posterior nerve roots, but no inflammatory changes of the investing meninges. Some single cells of the anterior horns had eccentric nuclei, and a lack of Nissl blocks. There was a slight increase of neuroglia in the pyramidal tract. The posterior sclerosis was limited to the *fasciculus gracilis* in the cervical cord. Some difficulty was experienced in following the sclerotic lesions in the medulla. The fillet was smaller than natural; marked sclerotic changes were met with in the *nucleus ambiguus* and in the motor nuclei of the glossopharyngeal of vagus and spinal accessory. There was evident atrophy of the vagus nerve, with a lack of myelination. In the cerebral cortex atrophy was found in some of the central convolutions, and the condition described by Campbell was found. The muscles of the larynx were also examined. The adductors were fully developed while the abductors were atrophied. There was nothing to indicate a primary peripheral degeneration of the recurrent laryngeal nerves, although unfortunately these nerves were lost before microscopical preparations could be made.

(203) War Deafness from Lesions of the Internal Ear.

An article by Got which was published in the *Revue de Laryngologie, d'Otologie et de Rhinologie* in January, 1916, dealing with war labyrinthitis, has appeared in English translation in the *Journal of Laryngology, Rhinology and Otology* of September, 1916. Ætiology of the condition has not been fully made out. War deafness occurs when a shell bursts not more than five metres from the ear. Beyond that distance the aerial concussion is too slight to produce a labyrinthine disturbance. In some cases the internal ear is injured by a bullet or shell splinter. The author has collected details of 283 cases, and finds that in 50.88% there was traumatic labyrinthitis without objective lesions of the middle ear. In 26.14% it was associated with lesions of the middle ear arising at the same time as the disturbance, and in 22.96% it was associated with defects of the middle ear antecedent to the war. It therefore appears that the condition supervened on normal ears in 70% of the cases. In regard to the pathological anatomy the only actual changes met with were hæmorrhages in the cochlea and vestibule, and detachment and disintegration of the membrane of Corti. The author attempts to identify the pathology of war labyrinthitis with that of Menière's disease. The symptoms include deafness, tinnitus, vertigo, spontaneous nystagmus, and disturbance of equilibrium. In the diagnosis the differentiation between war labyrinthitis and malingering and hysteria is important. In war labyrinthitis the deafness is not complete. Rinne's test is usually positive, and the lateralization of Weber's test is towards the sound or less affected side. The malingerer feigns not to hear any sound, even when a noise producer is used. The timbre and tone of the voice is not changed in either malingerers or hysterics. In malingering there is neither tinnitus nor vertigo nor nystagmus, unless the patients have been educated in other hospitals. The hysteric can usually be detected by reduction of the visual field, and by the abolition of the pharyngeal reflex. In simple cases cure is spontaneous. In the more severe the condition proves or remains *in statu quo*. It never gets worse. The treatment consists in keeping the patient at absolute rest, and in giving bromides and iodides. Counter irritation is of use, and when severe vertigo is present lumbar puncture may be employed. When recovery occurs after slight attacks the men are usually unfit to return to the front for two months. In the severer forms they should be placed in the reserve, or on half pay, temporarily, and the condition revised every three or six months. Auditory re-education, or lip reading, should be applied where permanent deafness occurs.

(204) The Treatment of Infections of the Accessory Sinus.

MacWhinnie describes a new method of treatment in accessory sinus suppuration (*New York Med. Journ.*, January 29, 1916). In the acute form of ethmoiditis following on a coryza or common cold, there is a large quantity of serous exudation, sometimes mixed with a small amount of mucus. The frequent use of the handkerchief is not so marked as in the muco-purulent form of ethmoiditis. This condition usually clears up in seven or fourteen days by attention to the general health, saline purgatives, sterilization of the alimentary tract with ox-gall and calomel, and depletion of the middle turbinal region with 4% solution of antipyrin or 1 in 1,000 of adrenalin, to promote adequate shrinkage. In the muco-purulent form there is generally a large amount of discharge if the trouble is confined to the anterior or the middle ethmoidal cells, and this necessitates the use of six or more handkerchiefs daily. If the sphenoidal or posterior ethmoidal cells are involved, hawking and expectoration are more pronounced. In the treatment of all forms of ethmoiditis adequate drainage must be established. In the examination of the various forms or types, thoroughness should always prevail. Firstly, an examination of the nasal cavities, the naso-pharynx, and pharynx should be carried out. Secondly, an examination of the blood should be undertaken, to ascertain whether the hæmoglobin index is approximately normal, and to find the relation of white to red corpuscles, and also to measure the blood pressure. Thirdly, an examination must be made of the condition of the alimentary tract, from the duodenum downwards. Where irregularities exist, every one should be corrected for the alleviation or cure of the ethmoidal discharge. Conservative operative treatment should be the aim. If too much of the middle turbinal is removed there may be a complete change of the vocal resonance, and, besides, scar tissue in this region as the result of operation would add to the work of the remaining turbinates. Exenteration of the ethmoidal area does not, in the majority of cases, lead to cessation of the discharge. Many months of after-treatment may be necessary before the area becomes covered over with scar tissue. Following the traumatism, the discharge is apt to infect a greater area than was originally involved, and there is always the possibility of the infection travelling to the cranial cavities. The author's method of treatment in all cases of acute and chronic purulent ethmoiditis is as follows: Application of antipyrine (4% solution) or adrenalin chloride with cocaine to the ethmoidal region until there is complete shrinkage. Application of the author's suction-pump for cleansing the cells; injection directly into the ethmoidal cells by means of a fine pipette of 50% solution of argyrol. The patient is instructed to keep this in the nose for one hour before blowing it out. This is carried out every day, or on alternate days, depending on the amount of reaction, six to twelve treatments usually sufficing. In a chronic muco-purulent type, treatment should be employed every day, and then two or three times a week and continued for three or four months. When the hæmoglobin index is below normal the patient should be given hypodermic injections of iron and arsenic. When the hæmoglobin index is normal, $^1/_{12}$ gr. (0.005 gm.) of bichloride of mercury in normal salt solution is injected intravenously every other day. In all cases of sinus infection the patient is given a capsule containing extract of ox gall, gr. 5 (0.3 gm.), calomel, gr. ½ (0.03 gm.), three times weekly. The patient's dietary is carefully considered, particularly with regard to fats. The author gives an illustration of the vacuum apparatus, and describes its method of use, and states that, if attention is paid to the details, as enumerated above, in conjunction with the author's instrument, the result would be a cure in 97% of cases.

Public Health.

THE HEALTH OF VICTORIA.

The following notifications have been received by the Department of Public Health, Victoria, for the week ending November 12, 1916:—

	Metropolitan. Cs.	Dths.	Rest of State. Cs.	Dths.	Total. Cs.	Dths.
Diphtheria	63	4	26	2	89	6
Scarlatina	13	0	2	0	15	0
Enteric Fever	2	0	2	0	4	0
Pulmonary Tuberculosis	25	9	9	5	34	14
Cerebro-Spinal Meningitis	7	—	0	—	7	—

INFECTIVE DISEASES IN QUEENSLAND.

The following notifications have been received by the Department of Public Health, Queensland, for the fortnight ending November 11, 1916:—

Disease.	No. of Cases.
Scarlatina	14
Pulmonary Tuberculosis	17
Diptheria	43
Varicella	22
Enteric Fever	30
Erysipelas	6
Poliomyelitis	2
Cerebro-spinal Meningitis	4

The following notifications have been received by the Department of Public Health, Queensland, during the week ending November 18, 1916:—

Disease.	No. of Cases.
Pulmonary Tuberculosis	8
Enteric Fever	24
Scarlatina	7
Diphtheria	31
Anterior-Poliomyelitis	2
Malaria	1
Cerebro-spinal Meningitis	2
Erysipelas	3
Ankylostamiasis	3

THE HEALTH OF TASMANIA.

The following notifications have been received by the Department of Public Health, Tasmania, during the week ending November 18, 1916:—

Disease.	Hobart. Cases.	Launceston. Cases.	Country. Cases.	Whole State. Cases.
Diphtheria	1	0	7	8
Pulmonary Tuberculosis	5	2	5	12
Scarlatina	1	0	3	4
Cerebro-spinal Meningitis	0	1	0	1

INFECTIVE DISEASES.

Two bulletins of the Quarantine Service have been issued on October 27 and November 10, 1916. The following information is contained in these reports:—

Variola.

Since the issue of the last Bulletin, no further case of small-pox has been reported in New South Wales. On October 25, 1916, the s.s. *Nikko Maru* arrived at Thursday Island from Yokohama, with a Chinese steerage passenger who was reported to be suffering from variola. The patient and the passengers for Thursday Island were landed and isolated in the Quarantine Station. Vaccination and disinfection measures were carried out, and the vessel proceeded in quarantine to Sydney. The patient died on October 27. Another person was found to be febrile, and was landed at Thursday Island for observation.

In the Dutch East Indies 158 additional cases have been notified since the publication of the last report. There have been 53 deaths. In the Straits Settlements 16 cases were notified between August 29 and October 16, 1916. During this period there were 3 deaths. Five cases were reported in Hong Kong during the week ending October 4, and 4 deaths. There were three cases of varioloid in the period from September 10 to October 7 in the Phillipine Islands.

Plague.

During the period from August 27 to September 30, 1916, there were 19,949 cases of plague and 14,453 deaths in India. In Ceylon 24 cases were reported between September 3 and September 30. In Java 43 cases, with 42 deaths, occurred between August 26 and October 6. The number of cases reported in Hong Kong from August 27 to October 4 was 5, and in the same period there were four deaths. In the Straits Settlements there were six cases from September 26 to November 9, and 5 deaths. Eleven cases were reported in the Uitenhage District in Cape Province, South Africa. Three cases were reported in Egypt between August 25 and September 14, with 1 death.

Cholera.

It is reported from Japan that 60 cases and 30 deaths occurred at Osaka between August 11 and August 30, and that there were 120 cases at Kobe during the week ending September 29, 1916. In the Dutch East Indies 20 cases have been reported since the issue of the last Bulletin and six deaths. There were 67 cases in the Philippine Islands in the fortnight ending October 28, 1916, and 27 deaths. In the Straits Settlements no further cases have occurred during September and the first half of October. There was one fatal case at Fusan in Korea on September 10, 1916.

Typhus Fever.

The following information in regard to the distribution of typhus has been collected from the reports of the United States Public Health Service.

(From the period August 26 to September 29, 1916).

Place.	Cases.	Deaths.
Austria-Hungary	1,566	—
Egypt	632	247
Russia	81	11
Mexico	52	123
Great Britain	13	5
Java	19	8
Germany	19	10
Turkey in Asia	16	7
Switzerland	8	—
Sweden	3	—
China	5	—
Japan	6	—
Greece	—	28
Canary Islands	—	1
Netherlands	—	1
Norway	—	1

One case of typhus was reported on board the s.s. *City of Agra* on August 19, 1916, at New York.

Rat Destruction.

A short report is appended on some experiments with sulphur fumigation conducted in Brisbane in September, 1916, Three rats were exposed for six hours to sulphur fumes, equivalent to three pounds per thousand cubic feet, in a brick and concrete chamber of just over six hundred cubic feet capacity. One rat survived. This rat was in a special box, and it is probable that the proportion of sulphur actually consumed was less than two pounds per thousand cubic feet. A further experiment showed that rats exposed for eight hours to this concentration, whether protected or unprotected, invariably died. None of the rats survived after eight hours exposure to fumes from two pounds of sulphur per thousand cubic feet. At this concentration respiratory difficulty was noted within five minutes; the animals were gasping after fifteen minutes; after twenty-two minutes they were in evident distress; and after 34 minutes no respiratory movements were noted.

The swimming power of rats was also tested. Fifteen specimens of *Mus decumanus* and 9 of *Mus rattus* were employed in these experiments. A full grown *Mus decumanus* swam for 15½ minutes before it gave in and sank. One *Mus rattus* swam 924 feet in 13 minutes in rough water, with a strong breeze. The average period before the rats became exhausted was 10.28 minutes for *Mus decumanus*, and a little over 14 minutes for *Mus rattus*. The latter dived better than the former, and swam at higher speed.

The jumping abilities of rats were tested by placing the animal in a circular metal receptacle 12 inches in diameter, and 13½ inches in height. A full grown *Mus rattus* had no difficulty in clearing the upper edge each time. When the

height was raised to 24 inches the rim was reached after several attempts. One rat, while being chased, leapt from the ground to the top of a table 2 foot 5 inches in height.

Another series of experiments were undertaken for the purpose of ascertaining the effect on rats of a fall from a height. A full grown *Mus decumanus* was dropped a distance of 50 feet into water. It seemed quite unaffected by the fall, and swam strongly. One rat fell over 50 feet, alighting on grass, and was uninjured. One fell the same distance on bare ground, but died within half an hour. Two survived a fall of 50 feet on to hard ground.

Vital Statistics.

BIRTHS AND MARRIAGES IN THE COMMONWEALTH.

The Commonwealth Statistician, Mr. G. H. Knibbs, has issued the ninth official year book containing the statistics for the period 1901 to 1905. Section V. deals with the vital statistics, and contains a very large amount of information.

Births.

In the year 1914 there were 137,983 births registered in the Commonwealth. Of these 70,604 were of males and 67,379 of females. The distribution of the births among the various States is also given. The figures are as follows:—

New South Wales, 53,641; Victoria, 36,222; Queensland, 19,682; South Australia, 12,904; Western Australia, 9,204; Tasmania, 6,017; Northern Territory, 58; Federal Territory, 55. The crude birth-rate for the Commonwealth works out at 28.05 per 1,000 of population. Tasmania has the highest birth-rate (30.33); Queensland comes next with 29.46. The birth-rate in South Australia is 29.33, that in New South Wales 28.96, that in Western Australia 28.45, that in Victoria 25.45, that in the Federal Territory 20.79, and that in the Northern Territory 15.46. There does not appear to be any correlation between the density of population and the height of the birth-rate. The birth-rate has increased in every State except Western Australia since the year 1904. In that year Western Australia had the highest rate, namely, 30.67, while the other State had rates as follows:—Tasmania, 29.92; Queensland, 26.99; New South Wales, 26.85; South Australia, 25.49; and Victoria, 24.74. In the year 1912 there was an apparent steep rise in the birth-rate, which is explained by the Statistician as the result of the introduction of the Maternity Allowance Act and the consequent shortening of the period between the birth and registration.

A comparison is drawn between the birth-rates in the different countries of the world and Australia. The highest rate was in the Russian Empire, where it was 44.0 in 1909, Rumania and Bulgaria had rates above 40 in 1913 and 1910 respectively. Rates varying between 36.7 and 30.4 were registered in Chile, Ceylon, Serbia, Hungary, Jamaica, Japan, Italy, Austria, and Spain. In Finland the rate was 29.1. The group with rates between 28.9 and 28.1 include Prussia, the German Empire, and the Netherlands. In New Zealand there was a rate of 26.0, Denmark had a rate of 25.6, Scotland one of 255, Norway one of 25.2, Switzerland one of 24.1, Ontario (Canada) one of 24, the United Kingdom one of 23.9, Sweden one of 23.1, Ireland one of 22.8, Belgium (1912) one of 22.6, and France one of 19.0. It will thus be seen that the birth-rate varies between 44 and 19, and that in the Commonwealth it is rather lower than the mean. A general consideration of the figures does not reveal the causes at work in the production of a high birth-rate. Climate alone has no influence, as can be seen from the fact that Russia heads the list, and is much above Ceylon, Jamaica and Queensland, and France is at the other end, while the rate in Finland, Norway and Sweden is higher. Religion does not appear to exercise much influence on the birth-rate.

In the next set of tables, the masculinity of the infants born is demonstrated. The masculinity rate is expressed the number of males born to every 100 females. In 1904 the masculinity figure for the Commonwealth was 105.13, in 1910 it was 106.38, and 1914 it was 104.79. In the Northern Territory the figures have varied within very wide limits, the maximum having been 277.78 and the minimum 68.75 The figures for the Federal Territory also showed considerable variation. In South Australia the masculinity figure for 1914 was 106.93. In Tasmania it was 105.85, in Victoria 104.91, in New South Wales 104.82, in Queensland 103.67, and in Western Australia 102.69. The highest masculinity figure was registered in Spain, where it was 108.3. Rumania, Portugal, Austria, Italy, Norway, Ireland, the Netherlands, Scotland, Russia, the German Empire, Finland, Hungary, Sweden, and Denmark show a higher masculinity rate than the Commonwealth, while Serbia, France and Belgium, Switzerland and England show lower rates. The masculinity rate throughout England is 103.6. While the total number of males born is consistently higher than that of the females born, the same does not apply to illegitimate children. During the period 1904 to 1914 the rate has varied between 100.98 and 107.75 for the whole Commonwealth, although every State except New South Wales has had a masculinity rate of under 100 in one or more years.

The total number of ex-nuptial births in the Commonwealth has risen almost steadily from 6,421 during 1904, to 7,438 in 1913, and in 1914 it was 7,263. The percentage of illegitimate or ex-nuptial births to total births has decreased from 6.24 to 5.26. In 1904 the rate was highest in New South Wales, when it was 7.12 Queensland came second with 6.9, Tasmania with 5.82, Victoria fourth with 5.74, Western Australia fifth with 4.36, and South Australia last with 4.0. In 1914 Tasmania headed the list with 5.9, Queensland came second with 5.77, Victoria third with 5.56, New South Wales fourth with 5.29, Western Australia fifth with 4.22, and South Australia last with 3.87. The figures given for the Northern Territory and the Federal Territory are too small to justify expression in percentages. It will thus be seen that the decrease was greatest in New South Wales and was still material in Queensland. In Victoria, Western Australia, and South Australia it was very small, while in Tasmania the rate actually increased. A comparison is drawn between the illegitimate birth-rates of the various countries. The figures given are numbers of births per 1,000 of unmarried and widowed female population. The Statistician remarks that the general circumstances in Australia in regard to the opportunity of marriage are probably easier than those in the older countries. In the period 1900 to 1903 the rate was 3.8 in Ireland, 6.8 in the Netherlands, 8.5 in England and Wales, 8.9 in New Zealand, 9.8 in Switzerland, 13.3 in the Commonwealth, 13.4 in Scotland, 15.5 in Spain, 17.2 in Norway, 17.8 in Belgium, 19.1 in France, 19.4 in Italy, 23.7 in Russia, 24.2 in Denmark, 24.3 in Sweden, 27.4 in the German Empire, and 40.1 in Austria. Here again the climate does not appear to have played any part in the production of this state of affairs, nor can the influence of religion be recognized from the figures. It is interesting to note that the only countries in which the illegitimate birth-rate has increased from the period 1880-82 to the period 1900-02 are France and Sweden. The decrease in Scotland was from 21.4 to 13.4, whereas that in the Commonwealth was but from 14.5 to 13.3. In England and Wales and in New Zealand a very considerable reduction was registered.

The number of cases of twins in the Commonwealth in 1914 was 1,390, and of triplets 11. It thus appears that one mother out of every 98 bore twins, and 1 out of every 12,415 bore triplets. It is stated that the proportion of multiple births is a fairly constant one.

From the figures set out the Statistician is able to state that when the father is older than the mother masculinity has a tendency to be above the average. It is difficult to trace any influence of the ages of either parent on the probability of multiple births.

A table is given showing the duration of marriage and the issue of mother of all ages. From this table we note that the increase on the average number of children per mother is gradual up to the end of the 25th year of marriage. In marriages that had lasted from 25 to 24 years, the average number of children per mother works out at 11.15, whereas the average for the mothers who had been married 30 to 31 years was 12 children, whereas the average

for those who had been married 31 to 32 years was 10.25. All other groups lay in between these two figures.

The following table deals with the interval between marriage and the first birth:—

Interval.	Number of First Children.
Under 1 month	535
1 month	637
2 months	908
3 months	1,108
4 months	1,384
5 months	1,776
6 months	2,329
7 months	1,987
8 months	1,581
9 months	3,813
10 months	3,218
11 months	2,154
1 year	9,247
2 years	2,805
3 years	1,294
4 years	599
5 years	341
6 years	259
7 years	158
8 years	118
9 years	81
10 years	56
11 years	40
12 years	49
13 years	30
14 years	22
15 years	14
16 years	11
17 years	15
18 years	4
19 years	6
20 years	3
21 years	2
22 years	3
23 years	1
Total	36,588

From this table it will be seen that of the 36,588 first children born, 12,245 were born within nine months of marriage. The Statistician points out that a certain number of these infants were prematurely born. There is, however, no other means for arriving at the proportion of these births. In another table the ages of the mothers and the interval between marriage and first birth are set out. There were three mothers aged 13 years at the time of the birth of the child. In one case the child was illegitimate, in one it was born less than nine months after marriage, and in one it was conceived in wedlock. Mothers at the age of 14 years at the time of the birth of the child bore 23 illegitimate children, 7 within the first nine months after marriage, and 1 at a later date. Mothers at the age of 15 bore 66 illegitimate children, and 22 within the first nine months of marriage out of a total of 91. The sum of ex-nuptial and nuptial births within nine months of marriage exceeded the number of births which took place nine months or later after marriage, when the age of the mother at the birth of the child was 16, 17, 18, 19, and 21 years. Mothers at the age of 19 bore the greatest number of illegitimate children, while the greatest number of children born within nine months of marriage was met with in mothers of 21 years of age at the time of the birth of the baby. The curve plotted of the number of illegitimate births at the different ages of the mothers shows a steep ascent up to the age of 19, a somewhat less steep descent to the age of 31, and a gradual flattening out of the curve at the higher ages. There were 50 births of illegitimate children by mothers of 40 years, 23 at 41 years, 18 at 42, 25 at 43, 10 at 44, 7 at 45, 6 at 46, 2 at 50, and 1 at 53 years. The curve plotted in a similar manner of the sum of ex-nuptial and nuptial births occurring within 9 months of marriage shows a steep upward tendency up to the age of 21, with a distinct notch corresponding to the apex of the illegitimate curve, and a steep descent which begins to slow down at about the age of 30. The number of children born within nine months of marriage was greater than that of the illegitimate children for all ages of mothers up to 32. In regard to mothers of the age of 33 at the time of the birth the condition is reversed, and this condition of affairs is maintained for mothers above this age. Four babies were born within nine months of marriage of mothers aged 44 at the time of the birth; two when the mothers were 45, and one when the mother was 47. The next table deals with the interval between birth and registration. In the vast majority of cases registration takes place within one month of birth. In 40% of the cases it was effected within seven days of birth. In a few individual cases it was delayed until two years and more.

Marriages.

During the year 1914 43,311 marriages were registered in the Commonwealth. The increase in the number of marriages since 1904 has been more or less uniform with the exception of the year 1913. In 1912 the number was 42,147; in the following year it fell to 41,594. In Victoria there were 240 less in 1908 than in 1907, and 414 less in 1913 than in 1912. In New South Wales the increase was interrupted only in 1913. In Queensland there was a slight drop in 1908, but none in 191]. A drop occurred in South Australia in 1914, and in Western Australia the drop occurred in 1909. In Tasmania drops of small magnitude occurred in 1909, 1910, and 1914. The crude marriage rate in the Commonwealth was 7.02 per 1,000 of population in 194. This rate increased gradually until 1907. In 1908 it fell from 7.87 to 7.76. The rate then increased to 9.07 in 1912. In 1913 it was 8.66, and in 1914 it was 8.80. The highest rate was in South Australia in 1911, when it was 9.81. In 1914 it was 9.37 in New South Wales, 9.11 in South Australia, 8.73 in Queensland, 8.31 in Victoria, 8.22 in Western Australia, and 7.78 in Tasmania. The lowest rate recorded during the 11 years in any State was 5.90 in Queensland in 1904.

A comparison with the crude marriage rates in various countries is drawn. The highest recorded rate was in Ontario (Canada) in 1913, *i.e.*, 10.0. In Rumania and Bulgaria the rate exceeded 9. The rate was between 8.0 and 8.8 in Japan, Hungary, Belgium (1912) and Prussia; it was between 7.1 and 7.9 in Germany, England and Wales, Netherlands, Italy, France, United Kingdom, Austria, Switzerland, Denmark, and Scotland; in Spain it was 6.8, in Ceylon it was 6.3, in Norway it was 6.3, in Chile it was 6.0, in Finland it was 5.9, in Sweden it was 5.9, in Ireland it was 5.1, in Serbia it was 44, and in Jamaica it was 3.1. Here again it seems to be difficult to discover any set of factors which would explain the lower marriage rate in Ireland, Serbia and Jamaica, and the higher rate in Canada, Rumania, Bulgaria and Australia. Returns have been published in London of the number of marriages in that city during the year 1915. The number given is 58,354, which would be equal to a marriage rate of about 13.

No less than 1,617 males and 8,574 females under the age of 21 years were married. A highly interesting table gives the number of bridegrooms and brides, with their ages at marriage, and showing their previous conjugal condition. The following represents a portion of the table:—

Age at Marriage.	Bridegrooms.			Brides.		
	Bachelors.	Widowers.	Divorced.	Spinsters.	Widows.	Divorced.
13	—	—	—	3	—	—
14	—	—	—	14	—	—
15	—	—	—	71	—	—
16	18	—	—	338	—	—
17	48	—	—	941	—	—
18	190	—	—	1809	1	—
19	451	—	—	2549	2	—
20	910	—	—	2842	3	1
60	18	30	1	7	12	—
61	9	30	—	1	3	—
62	3	21	1	2	10	—
63	3	18	2	2	9	1
64	6	14	—	1	9	—
65	3	16	1	1	11	—
66	4	24	—	2	5	—
67	1	12	—	3	4	—
68	5	15	—	1	4	—
69	2	15	—	2	7	—
70	3	11	—	—	3	—
71	1	10	—	1	4	—
72	—	9	—	2	3	—
73	1	10	—	—	1	—

Age at Marriage.	Bridegrooms. Bachelors.	Bridegrooms. Widowers.	Bridegrooms. Divorced.	Brides. Spinsters.	Brides. Widows.	Brides. Divorced.
74 ..	1	10	— ..	—	2	—
75 ..	3	5	— ..	1	—	—
76 ..	—	4	— ..	—	2	—
77 ..	1	1	— ..	—	—	—
78 ..	2	2	— ..	—	—	—
79 ..	—	5	— ..	—	2	—
80 ..	1	1	— ..	—	—	—
81 ..	1	—	— ..	—	1	—
82 ..	—	2	— ..	—	—	—
83 ..	1	—	— ..	—	—	—
84 ..	1	1	— ..	—	—	—
86 ..	1	—	— ..	—	—	—

The total number of divorcées who married again was 314. Of these one was 20 years of age, 4 were 21, and 26 were under 25 years. Five were over 55 years and the eldest was 63. The total number of divorcés was 271. The youngest divorced man who married again was 22 years of age. Five men of 60 and over married again. In regard to widows and widowers, the total numbers were 1,985 and 2,330 respectively. It will be seen from the table that young people of both sexes consoled themselves with another partner at a very early age. At the other end of life it appears that second marriages are more common than first marriages. A further table is given showing the relative ages of the parties married. Girls under 15 years all married men under 29 years of age. Of 707 men under 20 years, one married a woman of between 30 and 34, and a second married a woman of between 35 and 39. Women over 40 years of age distributed their favour among young, middle-aged and old men. Eleven married men under 24 years; 68 married men between 25 and 29 years; 107 married men between 30 and 34. In all 382 out of 1809 women who had reached the age of 40 at the time of marriage obtained partners under 40.. There were 992 women over 45 at the time of marriage, and of these 193 were married to men younger than themselves. There were 343 men who reached the age of 60 at the time of marriage. In four cases their wives were under 25 years of age, and in 14 their wives were between 25 and 29 years of age. It appears that 232 out of the 343 men of 60 and over at the time of marriage married women who had reached or passed the age of 45 years. From another table we learn that divorced males preferred spinsters to widows or divorced women, and the same holds good of the fairer sex. Of 271 men divorced who married again, 225 married spinsters, 29 married widows, and only 17 married divorced women. Similarly, of 314 divorcées 244 married bachelors, 53 married widowers and 17 married divorcés. In regard to the re-marriage of widowed persons, just under one-third of the widowers chose wives who had been married before, while just over one-third of the widows agreed to share their fortunes with men who had had experience of the conjugal state.

Some information is given in regard to the birthplaces of persons married, and of the occupations of bridegrooms. The Statistician appends a short note on the fertility of marriages, which is a figure arrived at by dividing the number of nuptial births registered by the number of marriages. The figure is supposed to indicate the number of children to be expected from every marriage. For the period 1907-11 it was 3.43, for the period 1912 it was 3.87, and for the year 1913 it was 3.85.

Of some importance to the future of the Commonwealth are the figures given in regard to the substitution of a mark for the signature in the marriage registers. In 1904 0.95% of the males and 0.91% of the females made a mark. The frequency of this sign of illiteracy decreased from that year to 1913, when it reached the figures of 0.36% and 0.38% for the two sexes respectively. In 1914 the male frequency was 0.41%, and the female was 0.38%. A glance at the table giving the percentages for the various States from 1904 to 1914 reveals that the highest degree of illiteracy was met with in Tasmania in 1904, when it was 2.8%. The figures given for the Northern and Federal Territories are excluded, since the numbers are really too small to admit of percentage expression. In 1914 the percentage had declined in Tasmania to 1.00; Queensland came second on the list. In 1904 the frequency of the mark signature was 1.72%, and this has improved steadily since. In 1914 it was 0.59%. In New South Wales it was 0.90% in 1904, 1.12% in 1905, and 0.36% in 1914. In South Australia it was 0.54% in 1904, in 1913 it was 0.17%, and in 1914 it was 0.19%. While the illiteracy was lowest in 1904 in Western, it is curious to note that the variations since that year have been above the level, and in 1914 the same figure as in 1904 was reached, viz., 0.53%. It will, therefore, be seen that while Western Australia had the lowest frequency of mark signatures in 1904, and Tasmania the highest, in 1914 Victoria had the lowest, and Tasmania had still the highest.

SYDNEY AND NEWCASTLE.

The usual returns for the month of October, dealing with the births and deaths registered in the Metropolis of Sydney and in the Newcastle District has been published in the *New South Wales Government Gazette* of November 10, 1916.

There were 1,848 births registered in Sydney during the month. This number is just above the average for October of the preceding five years. The birth-rate works out at an equivalent to 59.06 per annum, and compares favourably with the average for the past five months of October. There were 124 illegitimate births. This number is 24 more than the average. The illegitimate birth-rate expressed as an annual rate is 1.95 per 1,000 of population. The average for October of the preceding five years was equivalent to an annual rate of 2.34. Of the 1,848 births 325, or 18%, took place in hospitals and other public institutions.

The number of deaths registered was 676. The death-rate is therefore equivalent to an annual rate of 10.63 per thousand of population. The mortality rate is 1.6% above the average for the same period in the previous five years. There were 104 deaths of infants under one year of age, and 177 of persons of 65 years and over. The infantile mortality was 66 per 1,000 births, as compared with 59, which was the average for October during the previous five years. The oldest people who died were 92, 93, 94, 96 and 105 years of age.

As usual, the diseases of the cardio-vascular system produced a larger number of deaths than those of any other system. There were 105 in all, including 54 from organic diseases of the heart, 24 from cerebral hæmorrhage, 9 from acute endocarditis, 7 from atheroma, and 5 from *angina pectoris*. Of the infective diseases tuberculosis caused 44 deaths, of which 31 were due to pulmonary disease; pneumonia caused 28 deaths, broncho-pneumonia caused 19 deaths, pertussis caused 24 deaths, cerebro-spinal meningitis caused 10 deaths, acute bronchitis caused 8, diphtheria caused 7, septicæmia caused 5, enteric fever and tetanus caused 20 each, and scarlet fever, anthrax and pericarditis caused 1 each. There were in addition 22 deaths from diarrhœa and enteritis, 4 from syphilis, 5 from acute nephritis, and 1 from gonococcul infection.

Cancer killed 63 persons, and Bright's disease killed 35.

Of the deaths ascribable to abnormal puerperal conditions there were 5 entered under the heading of puerperal albuminuria, 3 under the heading of puerperal septicæmia, 2 under the heading of accidents of pregnancy, and 1 under the heading of puerperal *phlegmasia alba dolens*.

The statistician notes that during the month the Board of Health received notification of 187 cases of scarlatina, 123 of diphtheria, 106 of pulmonary tuberculosis, 34 of enteric fever, 14 of cerebro-spinal meningitis, and 1 of malaria.

The returns for the Newcastle District reveal that 196 births were registered during the month. Of the children born 92 were males and 104 females. Nine were illegitimate. The birth-rate is equivalent to an annual birth-rate of 40.32. The number of registered deaths during the month was 69, 36 being of males and 33 of females. In 29 instances the deaths took place in public institutions. The death-rate is equivalent to an annual rate of 14.04. Of the 69 deaths 10 were of infants under one year of age, and consequently the infantile mortality works out at 51 per 1,000 births. The death-rate is considerably higher than that of the corresponding month during the last 10 years, and is just below the mean for the preceding 12 months.

The number of deaths due to diseases of the circulatory apparatus was 17. Of the notifiable diseases, only tuber-

culosis and enteric fever were represented, the former having caused 3 deaths, and the latter 1. There were seven deaths from diarrhœa and enteritis, of which 5 were in children under 2 years of age. There were 3 deaths from pneumonia, 1 from acute bronchitis, 1 from broncho-pneumonia, 1 from pertussis, 1 from tetanus, and 1 from acute endo-carditis.

The number of cases of diphtheria notified to the Board of Health was 21, of scarlatina 20, of enteric fever 7, and cerebro-spinal meningitis 1.

Books Received.

A TREATISE ON MATERIA MEDICA AND THERAPEUTICS, INCLUDING PHARMACY, DISPENSING, PHARMACOLOGY AND ADMINISTRATION OF DRUGS, by Rakhaldas Ghosh, I.M.S., Edited by B. H. Deane, I.M.S., and B. N. Ghosh, F.R.F.P.S. (Glasg.); New Edition, 1916. Calcutta: Hilton & Co.; Cr. 8vo., pp. 698. Price, 5s. or 7s. 6d., including postage.

SURGICAL CONTRIBUTIONS, FROM 1881-1916, by Rutherford Morrison, M.B., F.R.C.S., in two volumes. Vol. I. General Surgery, Vol. II. Abdominal Surgery; 1916. Bristol: John Wright and Sons, Ltd. Roy. 8vo., pp. 427 and 953. Price: Vol. 1., 15s.; Vol. II., 30s.; Two Vols. 42s. net.

Medical Appointments.

Dr. Terence Aubrey Daly has been appointed Government Medical Officer at Cumnock, in the place of Dr. I. Aird.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xxiii.

Normanton District Hospital; Medical Officer.
Children's Hospital, Perth; Resident Medical Officer.

Medical Appointments.

IMPORTANT NOTICE.

Medical practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429 Strand, London, W.C.

Branch.	APPOINTMENTS.
VICTORIA. (Hon. Sec., Medical Society Hall, East Melbourne.)	Brunswick Medical Institute. Bendigo Medical Institute. Prahran United F.S. Dispensary. Australian Prudential Association Proprietary, Limited. National Provident Association. Life Insurance Company of Australia, Limited. Mutual National Provident Club.
SOUTH AUSTRALIA. (Hon. Sec., 3 North Terrace, Adelaide.)	The F.S. Medical Assoc., Incorp., Adelaide.
QUEENSLAND. (Hon. Sec., B.M.A. Building, Adelaide Street, Brisbane.)	Brisbane United F.S. Institute.
WESTERN AUSTRALIA. (Hon. Sec., 230 St. George's Terrace, Perth.)	Swan District Medical Officer. All Contract Practice Appointments in Western Australia.
NEW SOUTH WALES. (Hon. Sec., 30-34 Elizabeth Street, Sydney.)	Department of Public Instruction—Appointments as Salaried Medical Officers, with duties which include the treatment of school children. Australian Natives' Association. Balmain United F.S. Dispensary. Canterbury United F.S. Dispensary. Leichhardt and Petersham Dispensary. M.U. Oddfellows' Med. Inst., Elizabeth Street, Sydney. Marrickville United F.S. Dispensary. N.S.W. Ambulance Association and Transport Brigade. North Sydney United F.S. People's Prudential Benefit Society. Phœnix Mutual Provident Society. F.S. Lodges at Casino. F.S. Lodges at Lithgow. F.S. Lodges at Orange. F.S. Lodges at Parramatta, Penrith, Auburn, and Lidcombe. Newcastle Collieries — Killingworth, Seaham Nos. 1 and 2, West Wallsend.
NEW ZEALAND: WELLINGTON DIVISION. (Hon. Sec., Wellington.)	F.S. Lodges, Wellington, N.Z.

Diary for the Month.

Dec. 5.—N.S.W. Branch, B.M.A., Ethics Committee.
Dec. 6.—Vic. Branch, B.M.A., Annual Meeting.
Dec. 8.—Q. Branch, B.M.A., Annual Meeting.
Dec. 12.—N.S.W. Branch, B.M.A., Executive and Finance Committee.
Dec. 12.—Tas. Branch, B.M.A., Council and Branch.
Dec. 13.—South Sydney Med. Assoc. (N.S.W.).
Dec. 14.—Vic. Branch, B.M.A., Council.
Dec. 15.—N.S.W. Branch, B.M.A., Branch (Ordinary).
Dec. 15.—Eastern Suburbs Med. Assoc. (N.S.W.).
Dec. 19.—N.S.W. Branch, B.M.A., Medical Politics Committee.
Dec. 21.—City Med. Assoc. (N.S.W.).
Dec. 22.—Q. Branch, B.M.A., Council.

EDITORIAL NOTICES.

Manuscripts forwarded to the office of this Journal cannot under any circumstances be returned.

Original articles forwarded for publication are understood to be offered to *The Medical Journal of Australia* alone, unless the contrary be stated.

All communications should be addressed to "The Editor," *The Medical Journal of Australia*, B.M.A. Building, 30-34 Elizabeth Street, Sydney, New South Wales.